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ABSTRACT

This document provides a set of lessons and other teaching aids for either a semester-length course on the future or to infuse a futures perspective into other secondary social studies courses. The lessons were designed to fit into many different courses but are particularly appropriate for U.S. history, government, civics, modern social problems, world history, geography, and world cultures. The lessons are organized into three groups. Group one, "Warm-up Mini-Lessons," contains five short lessons, each designed to spur interest and provoke creative thinking. The six longer lessons in group two, "Tools of Futurists," focus on a variety of methodologies that futurists use to develop their forecasts. Group three, "Futures Issues and Topics," contains 19 lessons on a spectrum of substantive issues and topics. Each lesson includes objectives and reproducible handouts for the class. Class time required to complete individual lessons varies from one period to five or more periods. In addition to the lessons, three other aids are provided. These are: (1) an article on "The Art of Forecasting: The Future Made Easy;" (2) a comprehensive bibliography of 235 items which includes a wide range of materials; and (3) the appendix which lists future technological developments. (SM)

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TEACHING ABOUT

THE FUTURE

TOOLS, TOPICS, AND ISSUES

(Lessons for Grades 7-12)

John D. Haas
with
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Social Science Education Consortium, Inc.
Boulder, Colorado

Center for Teaching International Relations
Denver, Colorado

July 1987

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FOREWORD

In the preface to his 1980 work, *Future Studies in the K-12 Curriculum*, John D. Haas cited five reasons for including future studies in the curriculum. These reasons, which Haas described as particularly persuasive for him, remain compelling today:

1. Because children and youth have the greatest portion of the future available to them.

2. Because the time continuum is incomplete without the future to extend the past and present.

3. Because citizens need to be participants in decisions that affect their collective future.

4. Because individuals need to envision their personal goals as motivational spurs to action and achievement.

5. Because we all need to perceive the generations of our species not yet born in order to be stewards for them.

The corollary to this list of reasons for including future studies in the curriculum is a set of rather lofty goals for teachers who accept the challenge of helping students probe their personal and mutual futures. This publication is designed to assist those teachers by providing a set of lessons and other aids that can be used together as the basis for a semester-length course on the future or can be used selectively to infuse a futures perspective into other secondary social studies courses. We hope that teachers will find these lessons to be useful instructional materials, as well as a stimulus to their own thinking--and perhaps curriculum development--about the future.

James R. Giese, Executive Director
Social Science Education Consortium

INTRODUCTION

Studying the future is fun and fascinating for children, youth, and adults. It is also a natural extension of the time continuum--from past to present to future. The topic is multidisciplinary in nature and thus is congenial to many subjects in the curriculum.

The lessons in this volume were designed to fit into many different courses in the social studies curriculum at the secondary level--from grade 6 or 7 to grade 12. In particular, we see the lessons as appropriate for use in any of the following courses: U.S. history (grade 8 or 11); government/civics; modern social problems; and world history, geography, and cultures. On page 2 is a matrix indicating in which courses certain lessons might best be incorporated. We expect that teachers will pick and choose from among the 30 lessons, using lessons here and there as they see fit. The entire collection could also be the basis for a complete semester-length course on "The Study of the Future."

The lessons are organized into three parts: Part I--"Warm-up Mini-Lessons"; Part II--"Tools of Futurists"; and Part III--"Futures Issues and Topics." Part I contains five short lessons, each designed to fit the beginning or ending of a class period. These lessons (except Lesson 2) are what some teachers call "grabbers" or "fillers" and were created to spur interest and provoke creative thinking. The six longer lessons in Part II focus on a variety of methodologies that futurists use to develop their forecasts. Although the titles of the lessons may seem formidable, each method has been simplified so that it will be understandable to secondary school youths. Part III contains 19 lessons on a spectrum of substantive issues and topics. Class time required to complete individual lessons varies from one period to five or more periods. Lesson 12, for example, is a lengthy set of activities that could form the basis of a two-week unit.

In addition to the lessons, this volume also provides three other aids for teachers. Immediately following this introduction is an article on "The Art of Forecasting: The Future Made Easy." Following the lessons is a bibliography for teacher background reading on the topic of the future. While the materials listed in the "Resources" sections of individual lessons are confined to readily accessible materials (those that are still in print or are in wide enough circulation to be found in many libraries), the bibliography is more comprehensive, including a wide range of materials, including many that may only be found in libraries with a fairly extensive collection in the area. The last tool provided for teachers is an appendix listing "Future Technological Developments."

We all hope that you, the teacher, and your students will enjoy and profit from using these materials as much as we did in creating them for you.

MATRIX OF COURSES AND APPROPRIATE FUTURES LESSONS

Lesson Number	U.S. Hist. (Jr. High)	U.S. Hist. (Sr. High)	Govern-ment	Modern Social Problems	World History	World Geog.	World Cultures
1	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X
3	X	X	X	X	X	X	X
4	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X
6	X	X	X	X	X		X
7	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X
9		X	X	X	X	X	X
10		X	X	X	X	X	X
11	X	X	X	X	X	X	X
12		X	X	X	X		
13		X	X	X			
14			X	X			
15		X	X	X	X		X
16			X	X		X	X
17	X	X		X			
18				X	X	X	X
19		X	X	X			
20						X	X
21	X	X	X	X			
22	X	X	X	X			
23	X	X	X	X			
24	X	X	X	X			
25				X			
26		X	X	X	X		X
27	X	X	X	X			
28		X	X	X	X	X	X
29	X	X	X	X			
30	X	X	X	X			

THE ART OF FORECASTING: THE FUTURE MADE EASY

A Brief Introduction to Thinking about the Future

From The World Future Society*

There's a popular myth that futurists are in the business of predicting what will happen in the future. The truth is quite different. Futurists know better than most people that the future is not predictable: We cannot know what will happen in the future.

Then what do futurists do? Quite simply they try to suggest things that might happen in the future, so that people can decide what they want to make happen. By looking at current trends, for example, it is possible to make a projection of what might be the case in the future.

If the population of a city is growing at 2 percent a year, we can suggest that the city will have more people in the future than it has now and even calculate how many additional people might be added. But that does not mean the city will definitely have those additional people, because a lot of things could happen to stop or even reverse the city's population growth.

Knowing the possibilities of the future--that is, what might happen--enables people to choose. Unless they know that they have alternatives and what they are, people can't choose what they want to have happen, let alone make it happen. So the first step in creating a better future world is identifying the things that might happen in the future. Once the possibilities are identified, we can try to make the desired possibilities become realities and prevent the undesired possibilities from ever being realized.

Successful Anticipations

Thoughtful people agree on the desirability of thinking ahead so we can prepare for events.

There are many examples of instances where people have succeeded brilliantly by carefully anticipating what might happen and developing a well-thought-out strategy for dealing with the emerging situation.

Here are two examples:

The Emperor of Japan. As World War II neared its end, U.S. leaders had to decide what to do about the Emperor of Japan. Public opinion would have strongly supported his summary execution by hanging or almost any other method. But social scientists analyzing Japanese culture reported that the Japanese people are intensely loyal to the Emperor; his execution could cause massive unrest and many lives might be lost. On the other hand, he could help rally the Japanese people to support the occupation forces. Happy result: The Emperor's life was spared and, at his urging, the U.S. forces obtained the full cooperation of the Japanese people during the post-war era.

Putting Man on Moon. Shocked by the Soviet sputnik, U.S. officials poured funds into the nation's space program. A new field known as "technology forecasting" developed to help planners anticipate what technology might be capable of if it were given adequate funding. Soon an incredibly exciting but daunting idea began to take shape--first as a dream in the minds of a few scientists, then as careful plans, and finally in hardware: A man would be landed on the moon before the end of the 1960s. Happy result: Thanks to many studies and very careful planning, the U.S. succeeded in placing a man on the moon in 1969--an achievement that awed the world.

These two famous events illustrate two points about thinking ahead:

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First, the events could not have been known in advance. The Emperor might have been assassinated or brought to trial--even if, a month earlier, U.S. leaders had planned otherwise. The successful moon landing could have failed at the last moment due to all kinds of possible problems.

Second, careful thinking ahead can lead to remarkable success. Both the U.S. occupation of Japan and the Apollo program were tremendous successes largely because the leaders had carefully thought about the challenges they faced and had developed realistic plans to meet them.

Thinking ahead does not, of course, guarantee success. Nor does its absence ensure failure. Sometimes bad luck can overcome the most careful planning and good luck can made a fool look like a genius. But most of the time, victory belongs to the people who think ahead and not to those who don't.

Who Are Futurists?

In recent years, a number of scientists, scholars, government officials, business leaders, and others have become seriously interested in anticipating what lies ahead. They see anticipating the future as an essential activity because of the increasingly rapid changes in today's world.

These people are often called futurists. There is no fully accepted term for their emerging field, but a variety of terms are used: futures research, future studies, futurism, futuristics, futurology, conjecture, futures analysis, and so on.

Related fields sharing similar methods and concerns are called by such names as strategic forecasting, issues management, trend analysis, impact assessment, long-range planning, and so on.

Futurist vs. Planner

Futures research is often confused with planning, and the same person may do both. However, it is useful to distinguish between the two functions. When doing futures research, we try to explore the myriad possibilities of the future in order that we can understand the various opportunities and challenges that may lie ahead and can decide what we want to achieve.

Once we have decided on our goals, we then want to plan how best to achieve them. In planning, we set forth the steps we will take to reach our goals. Often that involves money, so we may need to start thinking about budgeting our time and money.

Example Plotting of Consequences

Futurists chart the possible consequences of actions or technologies in order to anticipate their possible effects. Unintended, unknown, and delayed consequences may prove even more important in the long run than the direct intended effects. The chart on the following page shows how consequences of three forms of technology could be charted.

The Effects of Technology

	First-Order Consequences	Second-Order Consequences	Third-Order Consequences	Fourth-Order Consequences	Fifth-Order Consequences	Sixth-Order Consequences
Automobile	People have a means of traveling rapidly, easily, cheaply, privately, door-to-door.	People patronize stores at greater distances from their homes. These are generally bigger stores that have large clienteles.	Residents of a community do not meet so often and therefore do not know each other so well.	Strangers to each other, community members find it difficult to unite to deal with common problems. Individuals find themselves increasingly isolated and alienated from their neighbors.	Isolated from their neighbors, members of a family depend more on each other for satisfaction of most of their psychological, needs.	When spouses are unable to meet heavy psychological demands that each makes on the other, frustration occurs. This may lead to divorce.
Improved Refrigeration	Food can be kept for longer periods in the home.	People stay home more, because they don't need to go to stores.	Same as above; also, more free time for wife.	Same as above. (Also, additional free time increases demand for recreation and entertainment.)	Same as above.	Same as above.
Television	People have a new source of entertainment and enlightenment in their homes.	People stay home more, rather than going out to local clubs and bars where they would meet their fellows.	Same as above. (Also, people become less dependent on other people for entertainment.)	Same as above.	Same as above.	Same as above.

Myths

Myth: Futurists try to predict the future and fail miserably.

Fact: Futurists try to identify events that might occur in the future. Occasionally they make forecasts, that is, statements indicating what they think is likely to happen if people allow current trends to continue. However, futurists believe that predictions--statements indicating that something definitely will happen in the future--are generally impossible, due to human decisions that alter the future and to the many uncertainties inherent in human life.

Myth: Forecasts and long-range planning are fine for governments or businesses, but they're not really useful for individuals.

Fact: Forecasts can help you plan your career, make investment decisions, even help determine where you should life. Forecasts tell people what fields will provide good employment opportunities (such as computer programming), what sort of businesses or stocks to invest in, and how many people will be living in a metropolitan area and what transportation problems they could create, perhaps convincing you to move nearer a subway stop. Individuals can profit by forecasts every day--from helping with major decisions down to whether or not to take an umbrella to work.

Myth: It is useless to think about the future, because we can't do anything about it.

Fact: The future is the one area of time that we can do something about. The past is finished: it is too late to change the present. The decisions that we make now can have an effect only on the future. Furthermore, we can do more about the more distant future than about the immediate future, because we have more time to do the things we need to do.

Methods of Anticipating the Future

We may not be aware of it, but we all develop, in the course of growing to adulthood, a variety of ways for thinking about the future. Most of us use these methods without being consciously aware of just what we are doing. Futurists in research institutes use methods that are really just sophisticated versions of techniques that ordinary people use in their everyday lives. These methods include:

Trend Projection: The percentage of people eating in restaurants rather than at home may increase for several years. If we wish, we can plot this trend on a chart and then project what the curve may be in, say, five years.

Scenarios: We all explore future possibilities through our imagination. For instance, we try to imagine what would happen if we accepted a job at a certain company: What good things--and bad things--might happen to us as a result of taking the job? Scenarios are attempts to imagine future possibilities on the basis of what we know (or think we know). Scenarios are useful in helping us to understand what might happen as a result of a decision we may make.

Consulting Others: Since "two heads are better than one," we may ask other people--often experts--for their opinions about the future. Other people can also advise us on whether we are likely to enjoy a trip to a certain city, for example. Business executives and government leaders constantly use consultation as a means of understanding the possibilities of the future and making better decisions. Futurists in research institutes have developed a special method, the Delphi Technique, for polling experts so as to develop the best possible results from consultation.

Models: Events that occur in the real world can be imitated in ways that help us to understand them better. A model of a building can help people to understand what a future building may look like. A map is a two-dimensional model that enables us to tell which streets we are likely to come to if we go in a certain direction.

Simulations: A model is a static representation of something, but it has a dynamic twin--the simulation. Generals and admirals simulate battles when they move their model ships and aircraft about, either on large maps or during "war games" that involve real troops, materiel, and even live ammunition. The game "Monopoly" simulates the real estate market. Games can also be played with real people playing various roles: In a game called "City," one person might be the mayor while others played the roles of slumlord, ghetto activist, city council, and so on.

Computer Simulations: Complex systems such as the U.S. economy can be modeled by means of mathematical equations, which can then be fed into a computer. Then data can be entered to express the situation in the economy at the present moment. After that, policy makers can ask various "What if" questions, such as "What if we increase the income tax rate by 20 percent?" This policy change probably will have numerous results, many of which might never have been anticipated, due to the complex interaction of the many variables. The computer might show, for instance, that a proposed increase in the income tax would reduce automobile sales by 30 percent and cut the GNP by 10 percent.

Further Reading

The Study of the Future: An Introduction to the Art and Science of Understanding and Shaping Tomorrow's World by Edward Cornish. World Future Society, 1977, 307 pages, paperback, $9.50. This general introduction contains a history of the futures field, biographies of leading futurists, an outline of methods, lists of organizations and books, and so on.

Futurcasting: Charting a Way to Your Future by Joel A. Kurtzman. ETC Publications, 1984, 94 pages, $9.95. How to use futures research methods to generate alternative futures for your personal and organizational life.

The Futurists, edited by Alvin Toffler. Random House, 1972, 321 pages, paperback, $7.95. Though a bit dated, this volume provides a readable introduction to the thinking of a number of prominent futurists.

Profiles of the Future: An Inquiry into the Limits of the Possible by Arthur C. Clarke. Holt, Rinehart and Winston, 1984, 251 pages, $15.95. This updated version of a futurist classic explores what technology may be expected to accomplish in the years ahead.

The Futurist Library: These volumes include the best articles from *The Futurist* magazine on each topic:

1999: The World of Tomorrow
Habitats Tomorrow
The Computerized Society
Careers Tomorrow
Communications Tomorrow
Global Solutions
The Great Transformation
Education and the Future

These books are 160-page, large-format paperbacks edited by Edward Cornish, editor of *The Futurist*, except for the last volume, which is 120 pages and edited by Lane Jennings and Sally Cornish, $6.95 each.

The World Future Society

The World Future Society is an association of people interested in how social and technological developments are shaping the future. The Society was founded in 1966 and is chartered as a nonprofit educational and scientific organization in Washington, DC, USA.

The Society strives to serve as a neutral clearinghouse for ideas about the future. Ideas about the future include forecasts, recommendations, and alternative scenarios. These ideas help people to anticipate what may happen in the next five, ten, or more years ahead. When people can visualize a better future, then they can begin to create it.

Resource Catalog

For a description of hundreds of books, tapes, and other materials dealing with the future, send $2 to World Future Society, 4916 St. Elmo Avenue, Bethesda, MD 20814. Request "Resource Catalog." This catalog describes books dealing with many specific aspects of the future (work, food, war, business, technology, education, etc.). Note: World Future Society members receive new resource catalogs when published.

Periodicals

The Futurist: A Journal of Forecasts, Trends, and Ideas About the Future. This fully-illustrated magazine presents the ideas of scientists, government officials, educators, and others concerning what may happen in the years ahead. *The Futurist* is the largest and best-known futurist publication. Included with regular membership, $25 per year.

Futures Research Quarterly: publishes scholarly or technical articles dealing with futures research. The journal is refereed by an editorial board consisting of leading future-oriented scholars. $60 per year for members; $75 for nonmembers.

Future Survey: a monthly summary of books and articles dealing with the future in a broad sense. This useful publication makes it easy to obtain a quick idea of what current thinking is in many areas of policy, from defense to family planning, from computers to environmentalism. Each year the abstracts prepared for *Future Survey* are organized into a volume, *Future Survey Annual*, for permanent reference. $49 per year for individuals or $75 for libraries (includes both monthly and annual volume).

For more information, or to order any of the above, write or call:

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PART I

WARM-UP MINI-LESSONS

1. WHERE ARE WE NOW?

Introduction:

Time is all of a piece, a continuum that only seems to progress from past to present to future. Human beings create "breaks" in time and say some events occur in the past; others in the present--the right now; and others in the future--from now to whenever.

To know about the future is to first understand the past-to-present portion of the continuum. The future doesn't merely arrive; it is part of a time progression--an extension of today. As a way of staring into the future, it is useful to assess where we are now, in this society, in this nation. This checklist activity provides an opportunity for students to consider where their society is today, in preparation for looking at the future of the United States.

Objectives: Students will be able to:

1. Select from a list of phrases that they believe describe the condition of society at the present moment.

2. Justify their choices.

Grade Level: 7-12

Teaching Time: 1/2 class period

Materials: Copies of Handout 1-1 for all students

Procedure:

1. Explain to students that time is a continuum, extending from past to present to future, and that one prerequisite to "knowing" the future is understanding the past and present.

2. Give to each student a copy of Handout 1-1, "Where Are We Now?" Tell them they are to check at least one item, but no more than three items, that fit with their ideas or feelings about where the United States as a society is at present. Explain that if none of the phrases provided describe their views, students can add their own phrases on lines 11-13.

3. Give the students about ten minutes to fill in the checklist, and then record the frequency of check marks for each of the ten items on the chalkboard. Place a star (*) before any item(s) on the chalkboard having a tally of ten or more (for a class of about 28-30 students).

4. Now ask the class why the starred items are so popular with them. Seek justifications for their choices.

5. Next, ask the class how many of the ten items they would consider *pessimistic*? [probably seven or eight] Why do they think there are so few *optimistic* items? Are some of the items they consider pessimistic actually *neutral*? Are items students added themselves more or less optimistic than the ten items on the original list? Why?

WHERE ARE WE NOW?

Having some idea where we are today can help us in thinking about the future. To show where you believe your country is today, check one, two, or three items in the list below. Check the items that come closest to your opinion of where we are today in the United States. If none of the phrases fit your ideas, try creating one or more of your own phrases on the blank lines at the end of the list.

____ 1. Just drifting along from month to month, year to year.

____ 2. Jumping from one crisis to the next.

____ 3. Near the end of a period of prosperity.

____ 4. In transition to a new kind of society.

____ 5. On the brink of war--somewhere.

____ 6. Pushed along by forces beyond our control.

____ 7. Moving toward more authoritarian controls.

____ 8. Heading toward a less desirable future.

____ 9. On the edge of a new frontier in space.

____ 10. Surviving amid many kinds of contradictions.

____ 11. _____

____ 12. _____

____ 13. _____

2. HERE TODAY, GONE TOMORROW

Introduction:

To live comfortably and effectively in the world today requires an awareness, understanding, and appreciation of the nature and processes of change. A grasp of the magnitude and rapidity of change is critical to taking responsible action for a quality life today and tomorrow. This lesson is designed to introduce students to this important concept through a brainstorming session.

Objectives: Students will be able to:

1. Identify changes that have taken place during the past several years.

2. Understand the nature and processes of change.

3. Understand how values and value positions are linked to change.

4. Speculate about changes in the future.

5. Determine appropriate responses to hypothesized changes of the future.

Grade Level: 9-12

Teaching Time: 1-2 class periods

Materials: Poster paper, marking pens, tape

Procedure:

1. Divide the class into groups of 3-5 students.

2. Ask groups to consider what things, values, or beliefs are disappearing from American life and culture. Ask each group to report one example. (One example for illustration would be the general disappearance of dime stores, such as Woolworth's.)

3. Give each group poster paper and markers. Request that groups brainstorm a list of things, values, or beliefs that are disappearing or have disappeared from American culture.

4. Allow about ten minutes for the brainstorming. Upon completion, post each of the group lists and review the items posted.

5. Give each group poster paper and ask that they now generate a list of things, values, or beliefs that have replaced or are replacing the items found on their first list. (For example: K- Mart stores have replaced Woolworth's.)

6. Post the list of replacement items, values, and beliefs and discuss. Once each item listed has been reviewed, ask students to make a series of generalizations about the nature of American life and culture today and to discuss how their lives are personally affected by the changes they have listed.

7. Give each group poster paper and ask that they now generate a list of things, values, and beliefs that they feel will be important in the next 10-15 years.

8. Post the "futures" list, reviewing each item. Ask students whether they feel they are prepared to enter the future. If students do not feel prepared, generate discussion on what each feels she/he would need to know, believe, or be able to do in order to effectively meet the challenges of the future.

Follow-up:

Following the conclusion of the activity, ask students to find evidence to support the following statement: "The world of today is increasingly more complex and interdependent than it was ten years ago. The changes that a shrinking world makes in each of our lives cannot and must not be ignored. We must respond to this realization not from the position of the 'passenger' but rather from the position of the 'pilot' of Spaceship Earth." Students may prepare written responses as a homework assignment.

3. WHERE IS HOME?

Introduction:

This lesson allows fun and playfulness as a warm-up for more serious lessons about the future. The lesson focuses on the idea that people may respond to the question "Where is home?" in many ways. The usual response is some form of an address. If we think of home as a matter of comfortability--a setting where we feel at ease--the response may be a room in a house or apartment, with certain family members or friends, or any place we feel comfortable. In a different sense, we may say that we live inside our bodies or inside our heads.

Life may be viewed as a journey in time and space. Thus, "when" and "where" are important factors. We are time travelers who forever seek new frontiers--new "homes" in time and place. This lesson focuses on the "where" aspect of that idea; Lesson 4 looks at the "when" aspect.

Objectives: Students will be able to:

1. Explain that people can identify many different locations as home.

2. Select from a list locations that are "home" to them.

Grade Level: 7-12

Teaching Time: 1/2-1 class period

Materials: Copies of Handout 3-1 for all students

Procedure:

1. With little introduction, hand out the checklist, "Where Is Home For You?" (Handout 3-1). Read the directions aloud; be sure students understand they are to check each item which they feel/think is "home" for them.

2. While the students are checking items, write the numbers 1-12 on the chalkboard in preparation for tallying how many students in the class checked each item. After about five minutes, ask the students to raise their hands for each numbered item they checked. Record the number of raised hands for each item on the board.

3. Ask students who checked particular items to state why they felt/thought that way. Try to accept in good humor all types of responses: the study of the future can be fun and can call forth imagination.

WHERE IS HOME FOR YOU?

People can answer the question "Where is home?" in many different ways. In the list below, check every item that is home to you.

_____ 1. The house where I now live.

_____ 2. My hometown.

_____ 3. My nation.

_____ 4. Planet Earth.

_____ 5. On the moon.

_____ 6. On a moon of Jupiter.

_____ 7. On an asteroid in the Milky Way galaxy.

_____ 8. On Alpha Centauri, a star "near" Earth.

_____ 9. In my body.

_____ 10. In my brain.

_____ 11. In a supercomputer.

_____ 12. In a DNA molecule, a part of a gene.

20

4. WHAT TIME IS IT?

Introduction:

This is another short, fun activity designed to stimulate students to "break out" from familiar and pat responses. From one perspective or another, each of the ten "answers" in the quiz used in the lesson is correct. The challenges for students, therefore, are: (1) to explain why one or more of the given answers is not a valid response to the question and (2) to create new ways of describing *now*!

Objectives: Students will be able to:

1. Distinguish between correct and incorrect descriptions of "right now."

2. Create new ways of stating "what time it is right now."

Grade Level: 7-12

Teaching Time: 1 class period

Materials: Copies of Handout 4-1 for all students

Procedure:

1. Ask the class, "What time is it?" Wait and smile before recognizing any raised hands! See how many different responses occur.

2. Give each student a copy of Handout 4-1, "What Time Is It?" Tell students to check as many answers as they think are correct. Ask them not to fill in blanks 11-13 at this time. Allow about five minutes to complete this part of the activity.

3. When all students are finished, ask all who checked response "1" to raise their hands. Ask those who did not raise their hands (if any) why they think the response is incorrect. The purpose is to elicit divergent rather than convergent thinking. Repeat the procedure for items 2-10.

4. Next, ask students to think of other statements or graphic representations (pictures, graphs, etc.) that "correctly" describe *now*, *right now*, *the present time*. Tell them to put their ideas on lines 11-13. Allow about ten minutes for this; then ask students to tell (or draw on the chalkboard) their creations. See if the rest of the class agrees with each new idea.

WHAT TIME IS IT?

Decide which items below are correct statements about the present time, *now*. Place a check mark before each item that you think is correct. You may check one or all, any or none!

Right now, it is:

_____ 1. January (or one of eleven other months)

_____ 2. Morning (or afternoon or evening or night or noon or midnight or dawn)

_____ 3. 1987 (A.D.) or ('88 or '89)

_____ 4. Spring (or summer or fall or winter)

_____ 5. Today (or one of seven days of the week)

_____ 6. The Second Millennium

_____ 7. The Twentieth Century

_____ 8. 1,500,000 Human years

_____ 9. 5,000,000,000 Earth years

_____ 10. 10,000,000,000 Sun years

_____ 11. _____

_____ 12. _____

_____ 13. _____

Now, add three of your own creations (statements or drawings) that correctly describe *now*. Use lines 11-13 for your creations.

5. SO YOU WANT TO TAKE A TRIP!

Introduction:

Before the NASA *Challenger* disaster in early 1986, most U.S. citizens took space travel, at least by that select group of individuals known as astronauts, for granted. In fact, a company, Society Expeditions, was offering in 1985 a space trip in Earth orbit for tourists with the money. They had planned to start such trips on October 12, 1992 (they may still be planning such a launch in that year). The company printed a brochure advertising the trip for a $200 registration fee; a deposit (to be held in escrow until 1992) of $5,000; and final payments in 1992 of $2,000 for preflight accommodations and training at a "space resort," and $50,000 for the 8-12 hours in flight (including two meals).

Your students are today between the ages of 12 and 18. By the time they are all 30 years old, space travel for tourists is likely to be a reality. Will they wish to go? Will they be able to afford such a trip? Why would one want such an experience? What does one experience and learn from such a thrilling activity? Are there risks and dangers?

Objectives: Students will be able to:

1. Imagine a plausible tourist trip to outer space.

2. Provide a rationale for going or not going on such a vacation.

Grade Level: 7-12

Teaching Time: 1/2 class period

Materials: Copies of Handouts 5-1 and 5-2 for all students

Procedure:

1. Tell the class that an actual company, Society Expeditions of Seattle, Washington, has advertised for participants in a vacation trip to outer space--an Earth orbit tour--to take place in 1992. Read them the price information from the "Introduction" section. Distribute Handout 5-1 and ask the class to read the planned itinerary for Project Space Voyage. After about ten minutes, ask if students have any questions on the planned trip; respond as best you can to the questions.

2. Distribute Handout 5-2 and ask the class to fill out the form. Give them about ten minutes to do this. Ask for a show of hands for *yes* or *no* responses to items 1-5 and for each choice in item 6. Encourage students to share what they wrote for items 7 and 8. There is probably no need to comment on student choices on the questionnaire, but students may raise questions during or after the reporting on the questionnaire; if they do, the questions should be discussed with the class.

ITINERARY FOR PROJECT SPACE VOYAGE

Pre-Flight Activities:

Day 1--

1. Arrive at Space Voyage resort in the late afternoon.
2. Orientation, dinner, and overnight.

Days 2, 3, 4--

1. Preflight briefings by staff and advisors.
2. Study and questions on Passenger Flight Manual.
3. Tour of facility and familiarization with cabin mockup.
4. Leisure activities (swimming, tennis, etc.).

Flight Scenario:

Day 5--

1. Arrive at launch site one hour before launch.
2. Enter cabin and move to preassigned seats by windows.
3. Final briefing and launch, including video monitoring of crew and liftoff.
4. Experience force of 3 Gs until orbit insertion at 1,000 miles downrange (after about seven minutes).
5. Constant video monitoring of crew, spaceship performance, and Earth.
6. Engine shutdown once in orbit and Zero G force.
7. Adjustment to weightlessness.
8. Familiarization with health, safety, eating, toilet, and so on.
9. Flight of 8-12 hours in Earth orbit (observations, photography, experiments, recreation, meals)
10. Retrofire, re-entry, and landing.

Post-Flight

Day 6--

1. Final debriefing and question/answer session.
2. Relaxation and recreation at resort.
3. Meals and overnight.

Day 7--

1. Depart for home!

PROSPECTIVE PASSENGER QUESTIONNAIRE

1. Would you consider such a vacation? Yes____ No____
2. Are you in average physical health? Yes____ No____
3. Do you have any fears of the trip? Yes____ No____
4. Is the cost of the trip within your means? Yes____ No____
5. Would you go alone? Yes____ No____
6. What would be your reasons for taking this vacation? (Check one or more of the following.)

   _____Pure Thrill and Enjoyment

   _____Educational

   _____Challenge of a New Experience

   _____Hobby (e.g., photography, astronomy)

   _____Vacation from Routine Jobs

   _____Possibility of Someday Living on a Space Colony

   _____Other (specify)_____
7. Where will you be living in 1992?_____
8. How will you travel to the space resort?_____

PART II

TOOLS OF FUTURISTS

6. THE TIME SERIES GRAPH

Introduction:

One way futurists portray change over time is the time series graph, a two-dimensional figure with horizontal and vertical axes. The horizontal axis is called the X axis, and the vertical line is termed the Y axis. Usually, the base or horizontal line displays time in seconds, minutes, hours, days, weeks, months, years, decades, centuries, or millennia. The time may extend from some time in the past to the present (such as the life of a teenager from birth to today in units of years) or from a point in the past, to the present, and then on to the future (such as A.D. 1900 to 2000 in decades). A model of a time series graph is displayed in Figure 1 on Handout 6-1.

The vertical Y axis, or up-and-down line on the left of the graph, is where one finds the factor or factors being changed. A factor is a topic of interest, such as U.S. oil imports from Saudia Arabia, a person's growth in height, or world population growth. Once the factor is selected, one needs to have a unit of measure for the topic: barrels of oil, height in inches or centimeters, or number of persons in millions or billions.

This lesson introduces time series graphs and provides students with the opportunity to practice interpreting such graphs.

Objectives: Students will be able to:

1. Read and interpret time series graphs.

2. Make inferences from data on a time series graph.

3. Imaginatively speculate on what given patterns might describe in the real world.

Grade Level: 7-12

Teaching Time: 2-3 class periods

Materials: Copies of Handouts 6-1 and 6-2 for all students

Procedure:

1. Distribute Handout 6-1. Then read the following paragraph to the entire class: futurists sometimes portray change over time--from past to present to future--by using time series graphs. Figure 1 is a model time series graph. The horizontal axis, or bottom line, is called the X axis. This is where time is displayed, usually from some time in the past to the present, and in some constant unit of time, such as a year or a decade. The vertical line, the up-and-down line on the left, is the Y axis. It is used to display the factor, or topic, being charted over time. A unit of measure is also needed for the topic: Figure 1 was units of 50, from 1 to 50 to 100. Now let's look at some real time series graphs and try to "read" them as though they were paragraphs in a narrative!

2. Direct students' attention to Figure 2. Ask some of the following questions about this time series graph:

- What are the units of time on the X axis? [years]
- What are the units of height on the Y axis? [inches]
- Who was taller at birth? [John]
- Who is taller at age 20? [John]
- Is John shorter or taller than you?

- Is Peter shorter or taller than you?

3. Have students turn to Figure 3. Ask them these questions:
   - What grade are you in and how old are you?
   - Are you "typical" according to this graph?
   - How old are typical students when they graduate from high school? [18]
4. Turn to Figure 4 and ask these questions:
   - Is this pattern of "decline" good or bad for you as a consumer? [good]
   - Why do you think computers keep getting cheaper?
   - Do you think this type of computer will ever be priced at $100? $50? $1?
5. Direct attention to Figure 5 and ask these questions:
   - What do the dashes in this pattern indicate? [future time]
   - How does the futurist know the population will decline? [he/she does not know for sure but assumes a peak and decline]
   - Why was there a dramatic increase in population in the past 2000 years?
   - What would a 2 percent increase in the size of your class mean? Of your school?
6. Turn to Figure 6 and ask:
   - Do you think world population will ever peak? If so, when?
   - How many persons can our world sustain?
7. Have students look at Figure 7. Ask:
   - What happened after about 20 days? [limits of oxygen and food supply began to take effect]
   - What shape is this curve? ["S," called a sigmoid curve]
8. Go on to Figure 8 and ask:
   - How is this curve like the one in Figure 7? Why? [it is S- shaped; the same limits are in operation]
   - After about 18 hours, what condition exists? [stability]

9. Pass out Handout 6-2. Divide the class into small groups of about three or four students each. Tell the groups they will now have to use their experiences and imaginations. For each of the four patterns on this handout, each group must "make up" what goes on the X axis (some unit of time) and what topic is on the Y axis in what units. This will be difficult for students, and they will need considerable time (maybe 15 minutes per figure) and encouragement.

After about ten minutes, see if a few groups have completed Figure A, and have them share their ideas with the rest of the groups. If no one has come up with an idea, suggest that it shows saving a dollar a day. After another 20 minutes, ask groups to share their ideas again. When almost all groups have some ideas for all four figures, debrief each group--one figure at a time. Have the students challenge the "logic" and "plausibility" of the ideas of the presenting group.

Follow-up:

Have each student create a "real" time series graph derived from some time sequence in their personal lives: time arrived at school for one week, number of times one yawns in a day or week, hours and minutes of sleep per night for a week, number of glasses of a beverage consumed per day for a week, number of articles in a daily newspaper on some topic each day for a week.

Resources:

Cetron, Marvin J. *Technological Forecasting: A Practical Approach*. New York: Gordon and Breach, 1969.

Cornish, Edward. *The Study of the Future: An Introduction to the Art and Science of Understanding and Shaping Tomorrow's World*. Washington, DC: World Future Society, 1977.

Fitch, Robert M., and Cordell M. Svengalis. *Futures Unlimited: Teaching About Worlds to Come*. Washington, DC: National Council for the Social Studies, Bulletin 59, 1979.

Haas, John D. *Future Studies in the K-12 Curriculum*. Boulder, CO: SSEC, 1980.

Kauffman, Draper, Jr. *Teaching the Future: A Guide to Future-Oriented Education*. Palm Springs, CA: ETC Publications, 1976.

Kauffman, Draper, Jr. *Futurism and Future Studies*. Washington, DC: National Education Association, 1980.

Kurtzman, Joel. *Futurcasting: Charting Your Way to the Future*. Palm Springs, CA: ETC Publications, 1985.

Salk, Jonas, and Jonathan Salk. *World Population and Human Value: A New Reality*. New York: Harper and Row, 1981.

READING TIME SERIES GRAPHS

Figure 1
A Model Time Series Graph

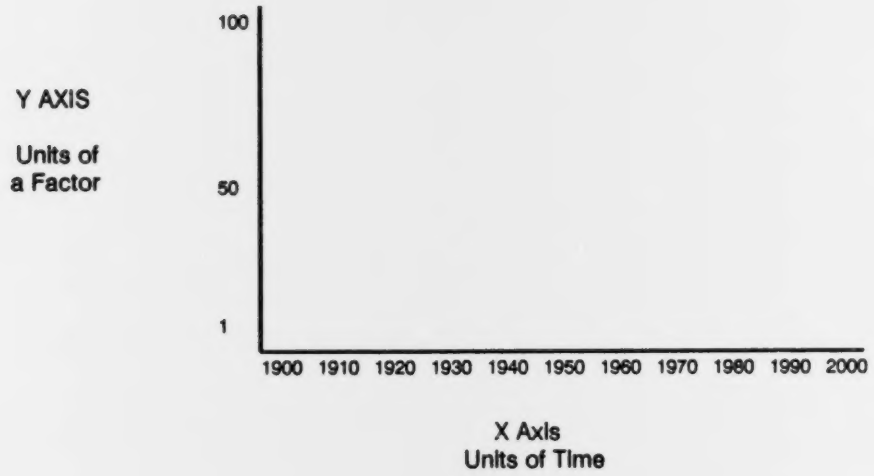


Figure 2
Growth in Height of Two Children

Figure 3
Relation of Age to Grade Level

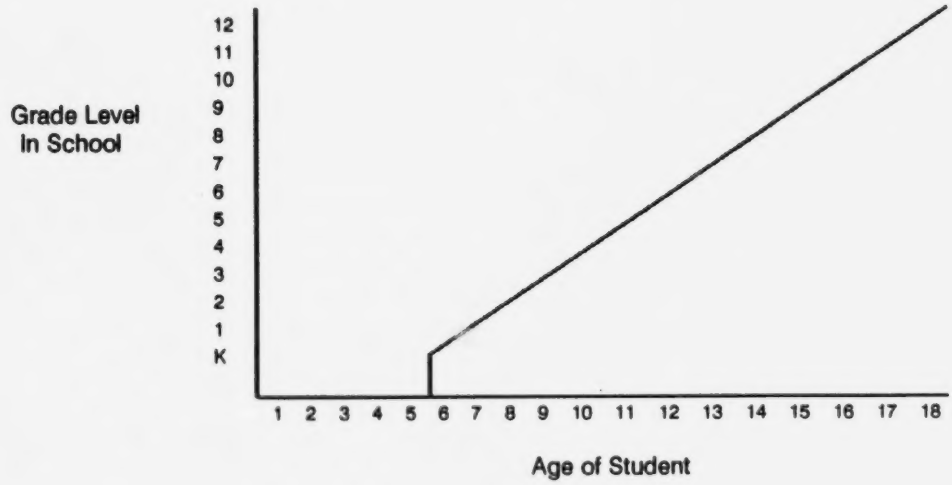


Figure 4
Price of 64K Computer

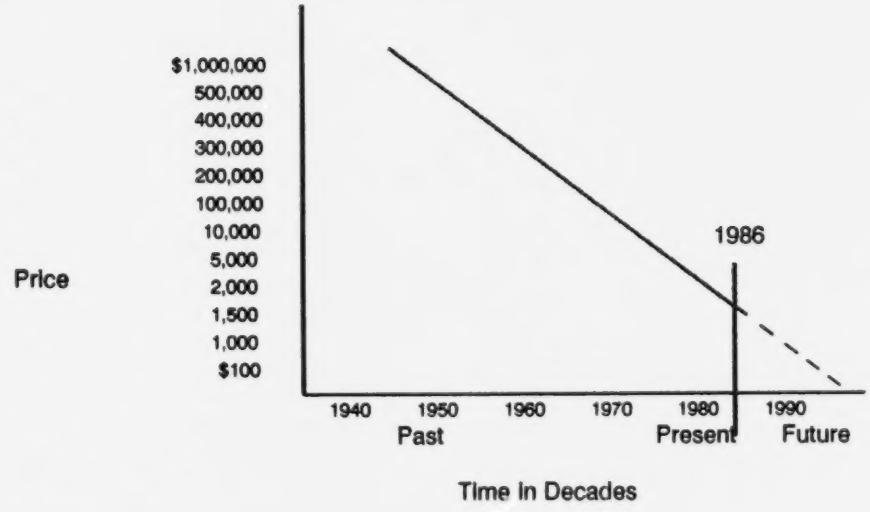


Figure 5
Percent Annual Increase of World Population

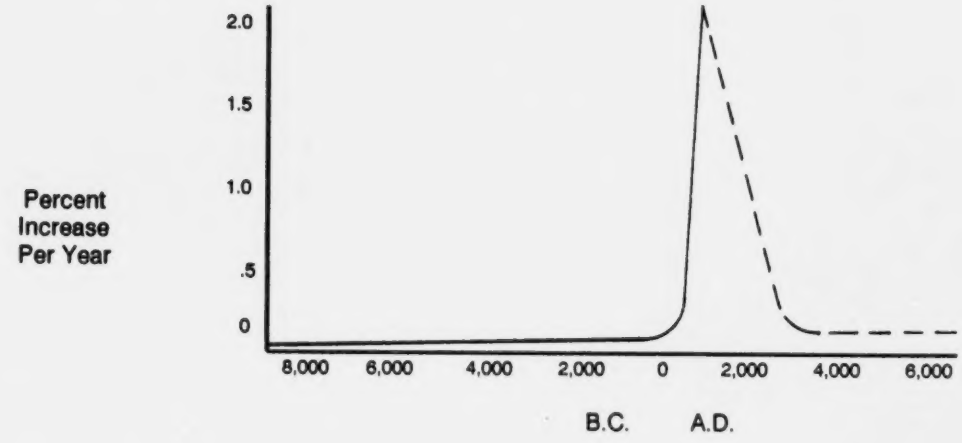


Figure 6
World Population Growth in Billions

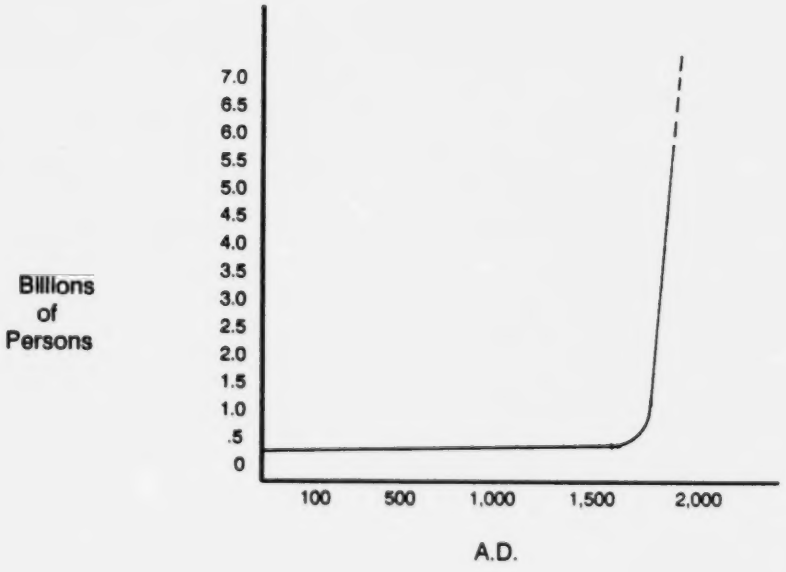


Figure 7
Growth of Fruit Flies in a Fixed Chamber

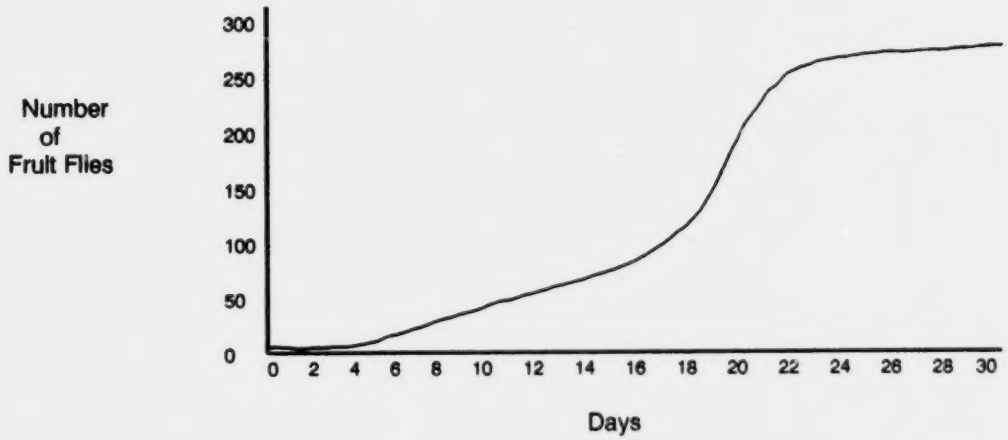
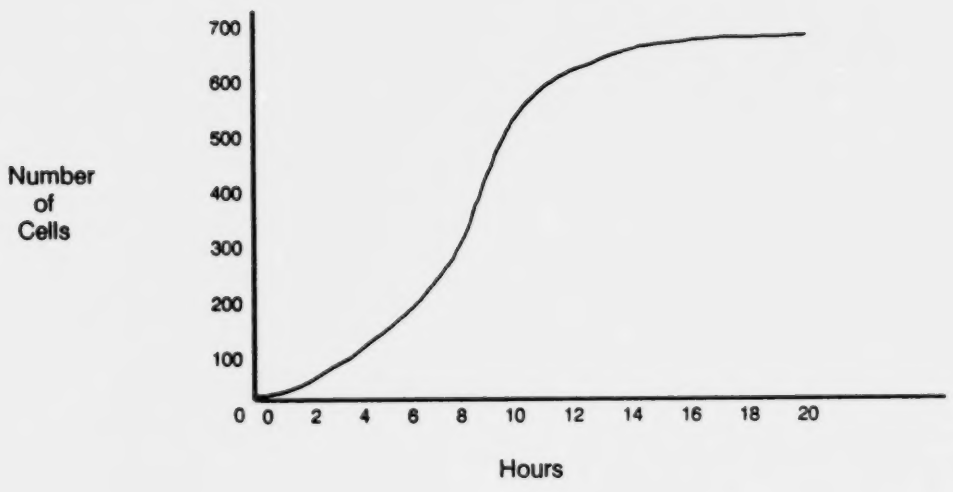


Figure 8
Growth of Yeast Cells



CREATING TIME SERIES GRAPHS

Figure A

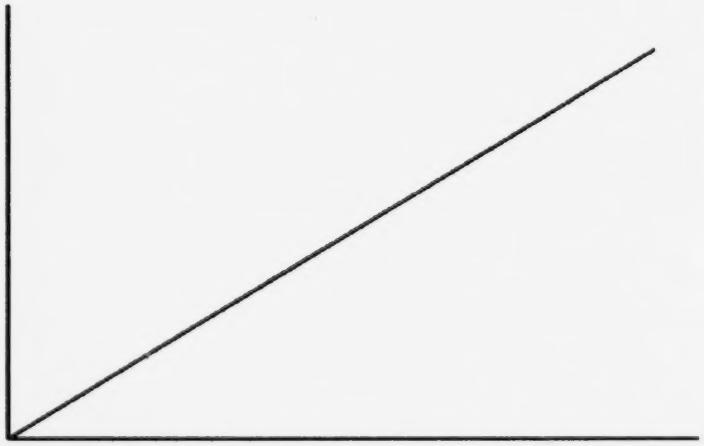


Figure B

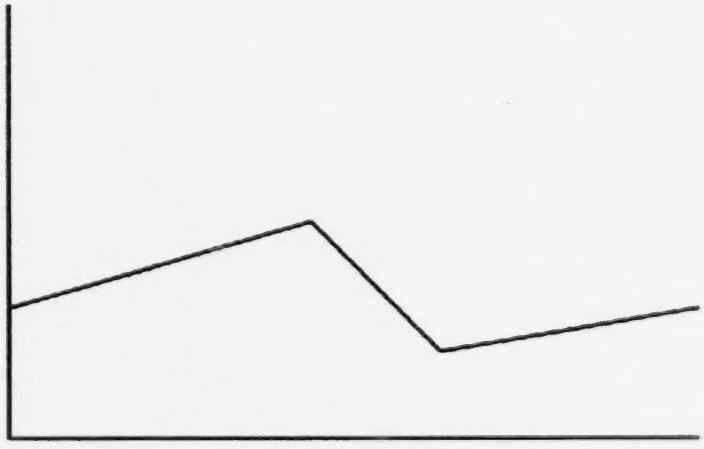


Figure C

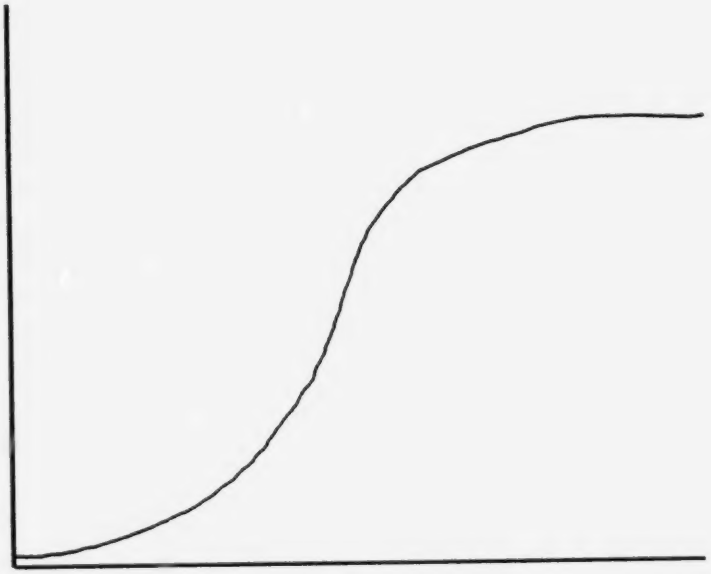
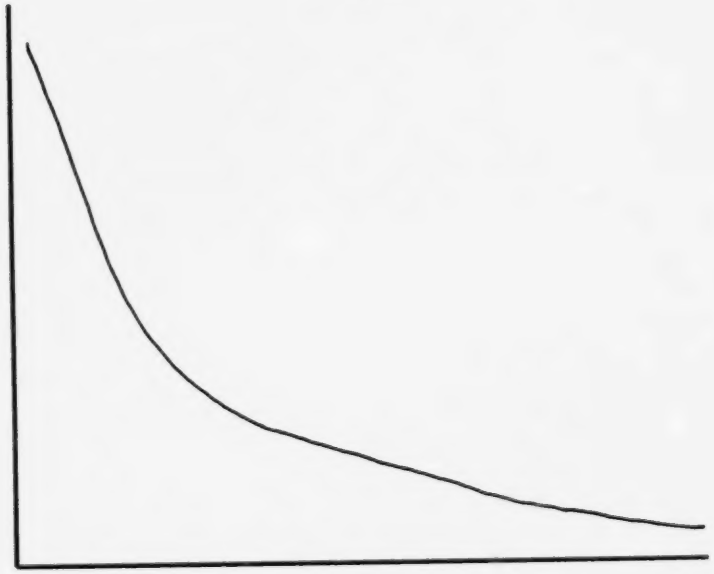


Figure D



7. THE FUTURES WHEEL

Introduction:

When a futurist forecasts that a significant event will occur, he/she knows that event will affect many other factors or events in the society (and perhaps in other countries). Futurists use several tools or techniques to assess the effects of a future event. One of these devices is the futures wheel (see Handout 7-1 for an example). The dynamics of the futures wheel are much like what happens when you drop a large stone into a very calm pond. As the stone hits and penetrates the surface of the water, there is a splash; then the displaced water flows outward from the point of contact in gradually diminishing ripples (miniature tidal waves) across the surface of the pond.

In the futures wheel, a single future event is placed at the center of the wheel (usually in a word or phrase enclosed in a circle). In the first ring of circles around the center are placed several--perhaps three to five--direct effects of the central event. In succeeding rings from the center are secondary or indirect effects of the central event linked to the factors in the first ring from the center. Every effect is stated in a word or phrase enclosed in a circle, and the circles are connected by lines--lines of influence radiating out from the central event. Four or five rings of circles (or more in complicated versions) may extend out from the center circle, all connected by lines of influence or impact. In this activity, students will interpret and complete several futures wheels.

Objectives: Students will be able to:

1. Identify direct and indirect effects of future events.

2. Interpret a futures wheel.

3. Complete a partially completed futures wheel.

4. Create a futures wheel.

Grade Level: 7-12

Teaching Time: 2 class periods

Materials: Copies of Handouts 7-1, 7-2, and 7-3 for all students

Procedure:

1. Explain that every event (whether present, past, or future) has an impact on other events or factors. Distribute Handout 7-1 and "talk" the students through an interpretation of this diagram, beginning at the center circle and proceeding outward to each succeeding ring of circles. Make sure students see that each circle in the first ring from the center will be influenced by the eventuality that only electric-powered cars will be in use and that the second ring then has impact on the effects shown in the circles in the third ring.

2. Divide the class into small groups of about three or four students each. Give each student a copy of Handout 7-2. Tell the students that this is a futures wheel like the one on Handout 7-1, but here the only part completed is the initial postulated future event in the circle in the center. Each group is to complete the futures wheel by showing the effects of the central event on factors they decide to include in the first ring away from the center. They are then to show the impact of this first ring of factors on other factors to be placed in the second ring. Allow about 30 minutes for completing this futures wheel. Ask a representative from each small group to tell the entire class what his/her group wrote in rings one and two.

3. Keep the students in their small groups and give a copy of Handout 7-3 to each student. Explain that each group is to fill in a central event in the center circle of this blank futures wheel and then proceed to complete rings one and two as they did with Handout 7-2. Again allow 30 minutes to complete the futures wheel and then ask a student in each group to tell the other students how their group filled in the futures wheel.

Resources:

Cornish, Edward. *The Study of the Future: An Introduction to the Art and Science of Understanding and Shaping Tomorrow's World*. Washington, DC: World Future Society, 1977.

Fitch, Robert M., and Cordell M. Svengalis. *Futures Unlimited: Teaching About Worlds to Come*. Washington, DC: National Council for the Social Studies, Bulletin 59, 1979.

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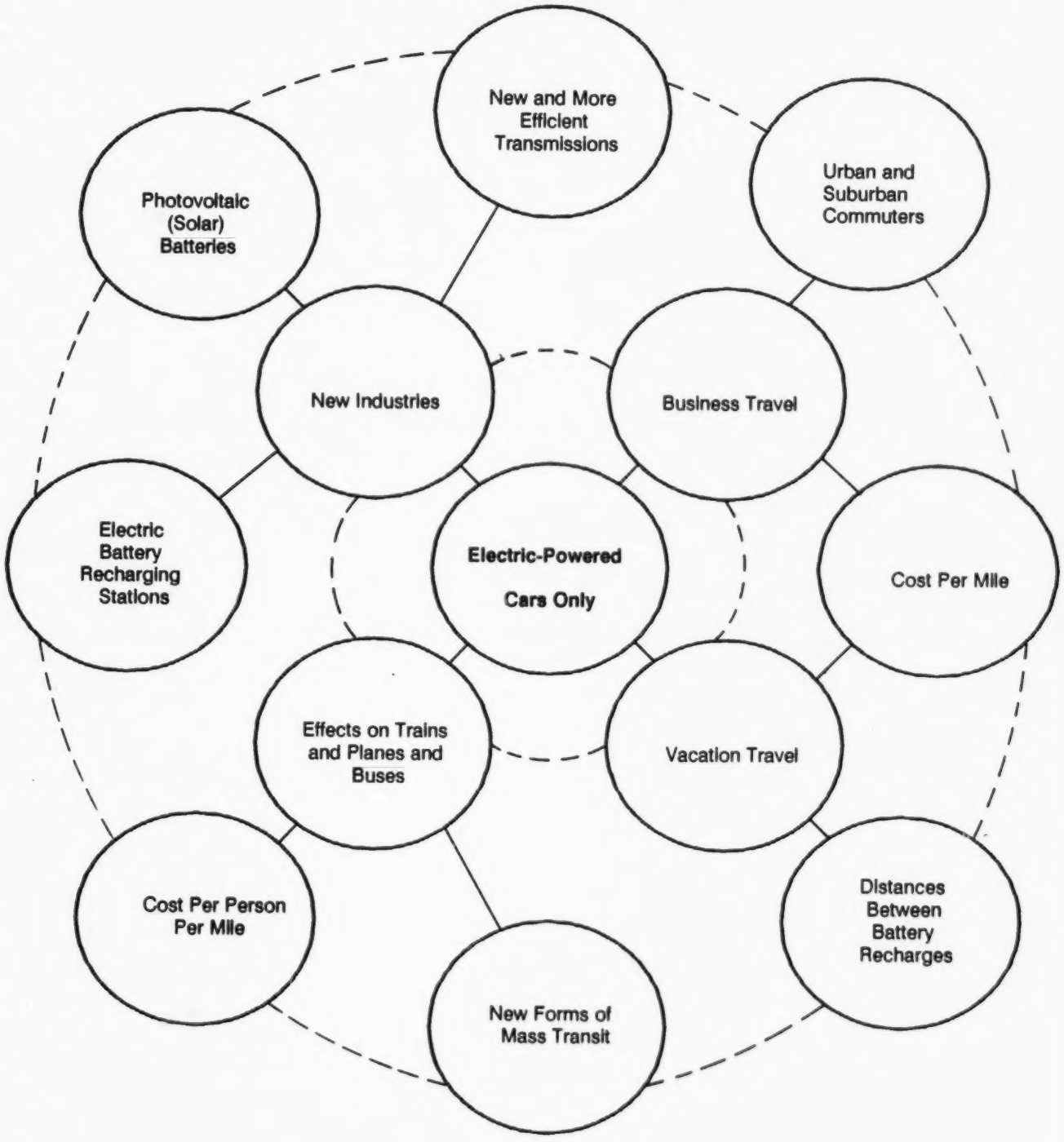
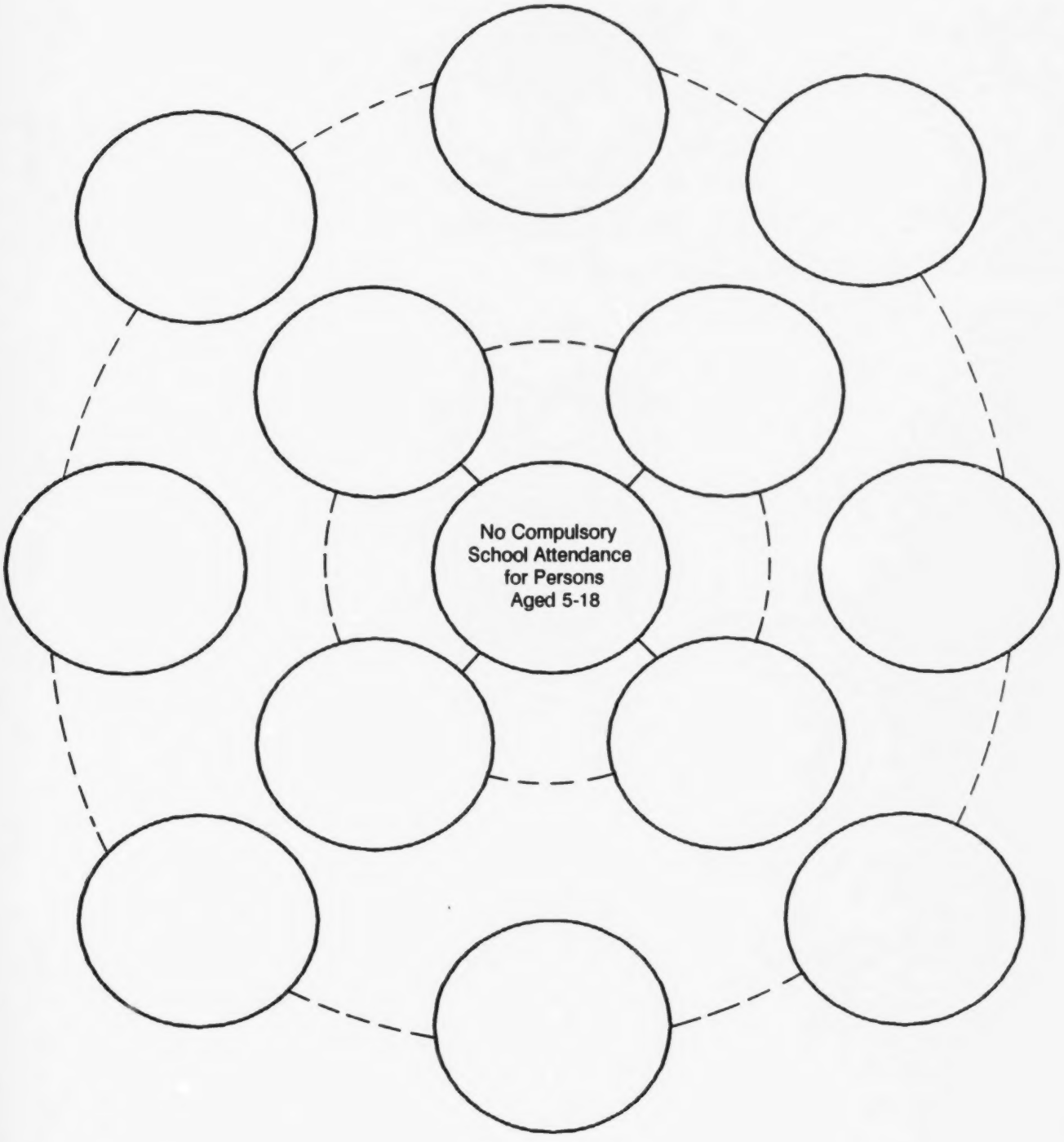
Kurtzman, Joel. *Futurcasting: Charting your Way to the Future*. Palm Springs, CA: ETC Publications, 1985.

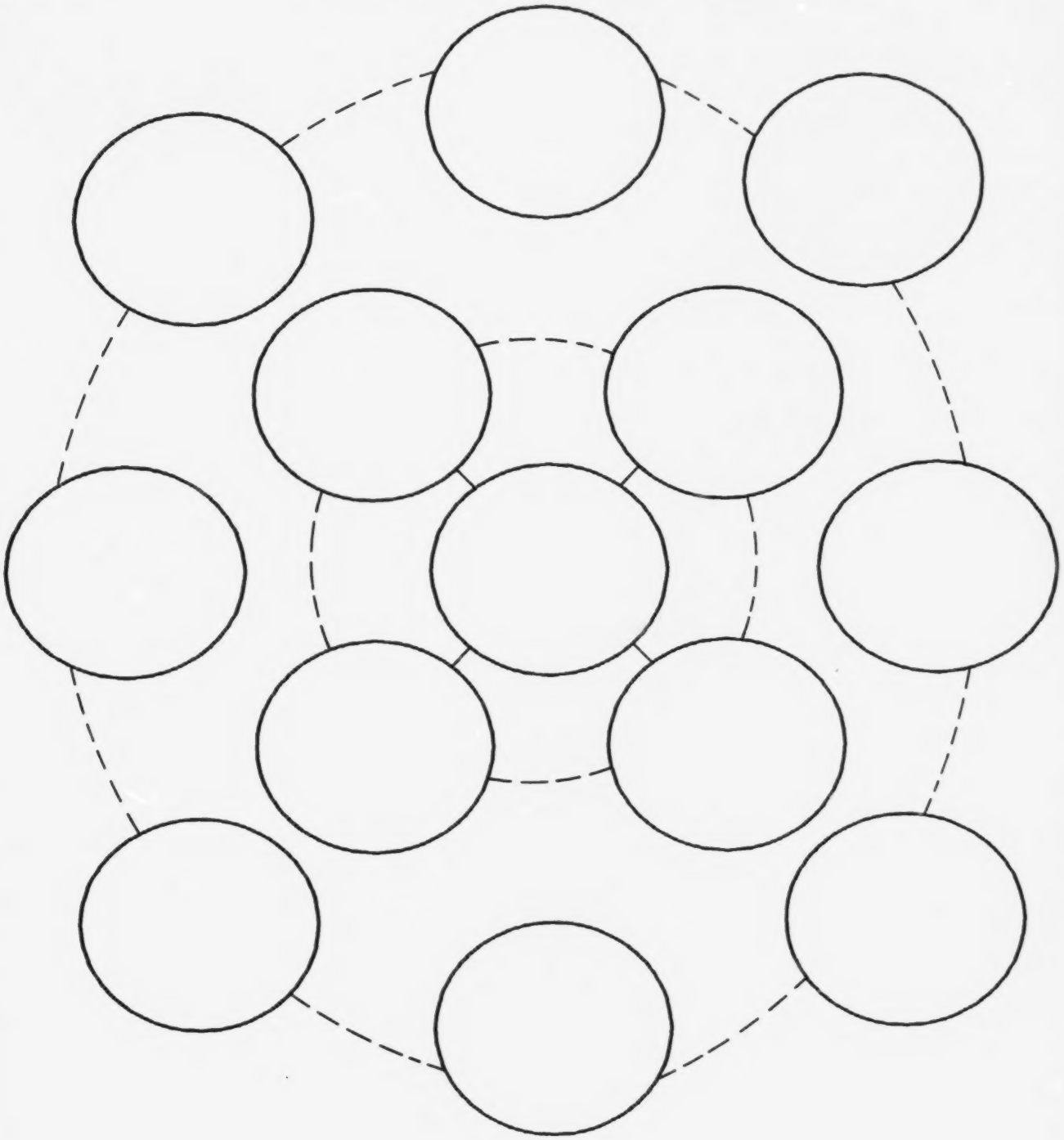
READING A FUTURES WHEEL



COMPLETING A FUTURES WHEEL



CREATING YOUR OWN FUTURES WHEEL



8. THE CROSS-IMPACT MATRIX

Introduction:

An event never occurs in isolation. Events interact and have impact on each other. It is therefore misleading to assert that event X will occur in the year 2000, since we know other events will occur simultaneously with that event; some of these simultaneous occurrences will have an impact on event X and on each other. In order to focus on some selected events they believe will occur concurrently, futurists created the technique called cross-impact matrix analysis. The basic format is a matrix. As an example, visualize a checkerboard, which is an 8 x 8 matrix (eight squares across by eight down).

A highly simplified matrix focusing on just two events would be a 2 x 2 matrix. A more intricate and complex matrix involving 10 or 100 simultaneous events would be a 10 x 10 or 100 x 100 matrix. The matrix has "squares" or cells to display how the events chosen have an impact on each other. Thus, a 2 x 2 matrix has four cells, a 4 x 4 matrix has 16 cells, and a 10 x 10 matrix has 100 cells. In this lesson, students examine, analyze, and discuss two 4 x 4 matrices.

Objectives: Students will be able to:

1. Understand the value and function of a cross-impact matrix as a futures technique.

2. Analyze the interactions in a cross-impact matrix.

3. Create a 3 x 3 or 4 x 4 cross-impact matrix.

Grade Level: 7-12

Teaching Time: 3 class periods

Materials: Copies of Handouts 8-1, 8-2, 8-3, and 8-4 for all students

Procedure:

1. To help students see how events have an impact on other events, pass out Figure 8-1. Go over the directions, explaining that students are to decide which factors or topics in Column B are affected by the occurrence, some time in the future, of a particular event in Column A. Tell students that there is not a 1:1 relationship between Column A and Column B; that is, an occurrence listed in Column A may have an impact on one or two or three factors listed in Column B. Give the class about 15 minutes to complete the exercise. Then debrief the activity by asking students for their choices, with accompanying explanations, for each item in Column A [many combinations are plausible].

2. Distribute Handout 8-2, a 4 x 4 cross-impact matrix. Explain the purpose of the cross-impact matrix as a futures technique. Ask if students agree with the impact statements in each cell; if not, how would they state the nature of the impact?

3. Give each student a copy of Handout 8-3, a 4 x 4 cross-impact matrix that is titled and has the factors identified, but has blank cells. Divide the class into small groups of three or four students each. Have each group describe the nature of the impact in each cell in a few words or a phrase. Let them figure out that no entry is made for certain cells because an event does not have an impact on itself.

4. With students still in their small groups, distribute Handout 8-4, a blank 4 x 4 matrix (that could be easily modified to become a 3 x 3 matrix). Have each group try to create a cross-impact matrix (3 x 3 or 4 x 4), using students' own ideas about the future. Give them a full period to do this. In the following period, debrief by asking each group to put its matrix on the chalkboard and explain it to the other groups.

Follow-up:

Have students (or groups of students) complete a cross-impact matrix using regular content from the course(s) being taught.

Resources:

Cornish, Edward. *The Study of the Future: An Introduction to the Art and Science of Understanding and Shaping Tomorrow's World*. Washington, DC: World Future Society, 1977.

Fitch, Robert M., and Cordell M. Svengalis. *Futures Unlimited: Teaching About Worlds to Come*. Washington, DC: National Council for the Social Studies, Bulletin 59, 1979.

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Kurtzman, Joel. *Futurcasting: Charting Your Way to the Future*. Palm Springs, CA: ETC Publications, 1985.

THE IMPACT OF A ON B

For each possible future event in Column A, choose one, two, or three items in Column B that might be affected by that event.

Column A

___ ___ ___ 1. Gas prices of $2.00 per gallon

___ ___ ___ 2. A colony in space

___ ___ ___ 3. No private ownership of automobiles

___ ___ ___ 4. Cure for cancer

___ ___ ___ 5. 30-hour workweek

Column B

A. Family vacations

B. Commuting to work

C. Business air travel

D. Life expectancy

E. School bus travel

F. Length of school week

G. Garbage disposal

H. Home telecommunication media (TV, VCR, etc.)

I. Federal income tax

J. Air pollution

READING A CROSS-IMPACT MATRIX

High School Goals of a Ninth-Grader

	"B" Average	School Band	Electives	Foreign Language
"B" Average	X	Homework and study time may cut into band commitments.	Homework, study time, and hard exams may leave little school time for electives.	It may be very difficult to earn a "B" if one has never studied a foreign language.
School Band	Lessons, individual practice, and band practices and performances will cut into study time.	X	Band commitments and study time may preclude taking any electives.	Band commitments plus other goals may make taking a language too difficult.
Electives	Academic courses plus electives may make a "B" average impossible.	Too many other classes may leave no room for band.	X	Academic course load plus band plus electives may leave no room for languages.
Foreign Language	It may be more difficult to earn a "B" in a foreign language course.	Study for a language may not leave time for band.	Academic work plus language and band may leave no time for any electives.	X

COMPLETING A CROSS-IMPACT MATRIX

	Nuclear Weapons Freeze	Balance of Military Power	U.S. Economy	U.S.S.R. Economy
Nuclear Weapons Freeze				
Balance of Military Power				
U.S. Economy				
U.S.S.R. Economy				

CREATING A CROSS-IMPACT MATRIX

9. THE DECISION TREE

Introduction:

Often in planning for the future, leaders, decision-makers, and citizens need to see a plan, policy,or decision in graphic form so they can visualize various "routes" to the "final destination." A technique for portraying future plans (i.e., goals and means of attaining the goals) is the decision tree (also called a relevance tree). Although the metaphor of a "tree" is used here, the tree is most frequently shown in a horizontal position, like a tree that has been cut down. On the left is the "trunk" or starting point, usually a point in time at the present or in the near past. As you trace decision points from left to right, you encounter possible or probable future events that either hinder ("no" or "no go") or enhance ("yes" or "go") progress toward the desired goal.

Handout 9-1 provides an example decision tree for the goal of producing a gasoline-powered car that gets 100 miles to the gallon of lead-free gas. In this lesson, students analyze that example and complete or create two other decision trees.

Objectives: Students will be able to:

1. Interpret a decision tree.

2. Complete a partially drawn decision tree.

3. Create a decision tree for a personal life decision.

Grade Level: 10-12

Teaching Time: 2 class periods

Materials: Copies of Handouts 9-1 and 9-2 for all students

Procedure:

1. Explain to the class that one tool used to plan the future is a decision tree or relevance tree. The technique traces the consequences of a goal to be achieved in the future--say a high school senior's goal to earn a bachelor's degree in four years of college. It is called a tree because it has a main trunk and branches. It can be pictured as growing from the bottom of a page to the top or (more commonly) from left to right, as if it were a "cut-down" tree. On the bottom (or at the left) is the starting point in time--the first crucial decision, followed by many decision points along the trunk and spreading branches, until the desired goal is reached. Along the way are alternative futures, arrived at because there were obstacles to the main goal.

2. Give each student a copy of Handout 9-1. Have each student follow along with you as you trace the decision points, moving from I at the left, to VI at the right, and finally to the production of a prototype car for full-scale testing. Along the route of decisions, you should point out the nine possible "negative" futures that lead either to "Postpone Project" (PP) or to further "Research and Development" (R & D). Only Future 10 is "positive," in that it leads to the production of a prototype model of the desired automobile.

3. Next, distribute copies of Handout 9-2. In this example, only the goal--forming a coed high school soccer team--is on the decision tree. Form the class into work groups of about three or four students each, and ask the groups to complete the decision tree. Tell the groups that a helpful starting point is to list on a separate piece of paper the many decision points involved in starting the new team.

4. Finally, ask each small group of students or each individual student to create a decision tree for a goal that someone their age might want to achieve in the next one, five, or ten years.

Resources:

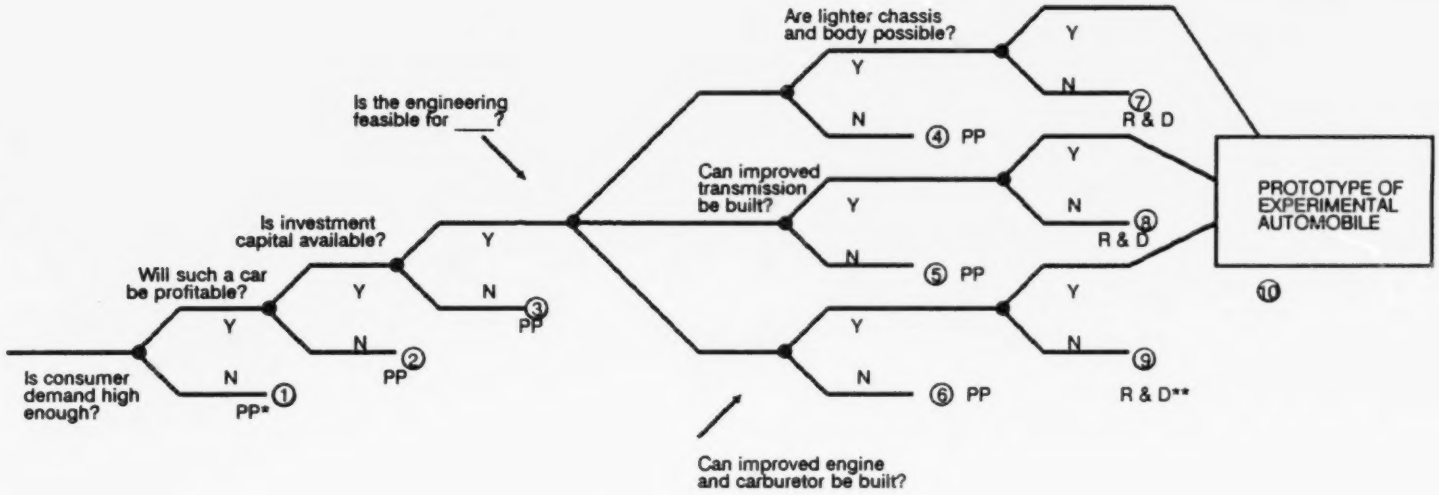
Cornish, Edward. *The Study of the Future: An Introduction to the Art and Science of Understanding and Shaping Tomorrow's World*. Washington, DC: World Future Society, 1977.

Fitch, Robert M., and Cordell M. Svengalis. *Futures Unlimited: Teaching About Worlds to Come*. Washington, DC: National Council for the Social Studies, Bulletin 59, 1979.

Haas, John D. *Future Studies in the K-12 Curriculum*. Boulder, CO: SSEC, 1980.

READING A DECISION TREE

Decision Tree for Producing a Car that Gets 100 Miles per Gallon of Lead-Free Gas

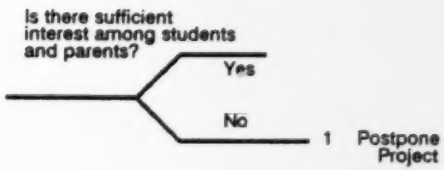


* = Postpone Project = PP

** = Research and Development = R & D

COMPLETING A DECISION TREE

A Decision Tree for Forming a Coed High School Soccer Team



FORM THE TEAM!

10. TREND FORECASTING/ENVIRONMENTAL SCANNING

Introduction:

The most popular form of futures forecasting is the extrapolation of past-to-present trends into the future. This technique is called trend extrapolation or trend forecasting. If, for example, population growth in a small city in the United States has been at the 2 percent level for the past 40 years, one might extrapolate (or extend) this trend into the future, say for the next 15 years. This mode of forecasting assumes continuity (as opposed to change) from the past to the present and into the future. It assumes a trend or pattern will remain constant with little variation. It further assumes that dramatic shifts and "revolutions" are uncommon and relatively unpredictable.

One way to do trend forecasting is by use of the technique of environmental scanning. This involves selective scanning of the voluminous popular literature: newspapers (e.g., *Wall Street Journal*, *New York Times*, *Washington Post*, and local papers), newsmagazines (e.g., *Time*, *Newsweek*), best-selling non-fiction (e.g., *Megatrends*), general interest magazines (e.g., *Omni*, *Money*, *Atlantic*), radio programs (e.g., National Public Radio), television programs (e.g., "Nova" series on PBS), and other similar sources. With a little practice, one quickly picks up the skill of "scanning," of picking out items that describe present trends on crucial topics. Most items can be summarized in 50 words or less (look for totals and percents), and then can be keyed to one of several topic categories. Students will have an opportunity to practice using the scanning techniques in this lesson.

Objectives: Students will be able to:

1. Selectively scan the news of the day.
2. Select, clip, and file possible trend items.
3. Use a category system for keying items.
4. Become interested in and pursue a category.
5. Describe trends within a single category.

Grade Level: 9-12

Teaching Time: 3 class periods

Materials: Copies of Handout 10-1 for all students; enough 3" x 5" cards for each student to have 10-20 cards; enough copies of recent newspapers and magazines for all students to select and clip trend items (students might be asked a week or two in advance of this lesson to bring in newspapers and magazines their families no longer need or use; be sure to provide storage places for these); sample trend cards prepared by the teacher

Procedure:

1. Explain to the students the technique of trend forecasting; describe environmental scanning as one form of this type of forecasting. Illustrate trend forecasting by having students draw on past-to-present trends they have experienced already in their lives. For example, every year students have been in school, they have 180+ days; thus, unless they are seniors, next school year will also be 180+ days. Other examples for students to consider are the fact that the size of an elementary school's first grade next year depends on that school's kindergarten class this year, plus new residents and minus families that move; and the life cycle in families of birth, growth, and death as represented by grandparents, parents, and children.

2. As a tool both to guide the scanning process and to aid in keying and filing items, a category system is useful. Give each student a copy of Handout 10-1, and explain the three-letter codes or symbols, the 14 major categories, and the examples (by no means a comprehensive list). Encourage students to familiarize themselves with the system, by asking for their "opinion forecasts" (based only on experience, hunches, and intuition) of trends for four or five examples drawn from several categories.

3. Before turning the class loose on the newspapers and magazines (they can also draw from radio and television, at home and/or at school), show them how you did a few sample cards (four or five) and where you found the items you summarized. Here you can point out the ways to summarize an article in 50 words or less: by focusing only on the trend(s), by being cryptic in use of words, and by using numbers or percents. Be sure you read the symbol of the category you assigned each card to; emphasize that the symbol should be placed in a consistent place on every card.

4. Next, make sure each student has ten or more 3" x 5" cards and at least two sources (i.e., newspapers and magazines). Have them search for just two trends; summarize each one on a card; and then key each card to a category by use of one of the three-letter symbols. Give students about 30 minutes to do this. Then ask each student to read to the class one card (i.e., summary of trend and symbol for category).

5. Now students should be ready to continue scanning, searching out items, summarizing items on cards, and keying cards to categories. Give them an hour for this (in class, as homework, or as a combination of the two), and encourage them to do at least ten cards, but to do more if they want.

6. When each student has ten cards ready, there will be approximately 250-300 cards among all students in the class. On the chalkboard, record the number of cards prepared for each of the 14 categories. For the category with the most cards, have students read their trends to the class. Do a few more categories (maybe the second- and third-place categories from your chalkboard tally) if you want and have the time.

Follow-up:

If you wish to extend the lesson into a project for a few weeks, a quarter, or for the rest of the semester, have each student (the entire class or only those so inclined) specialize in just one or two categories. The end result of such a project might be one of the following: (1) a collection of 40- 50 cards in a single category, (2) a compilation of 40-50 cards in a summary essay, (3) a collection plus a scrapbook, (4) an essay plus a scrapbook, or (5) a short story (or other creative product) based on the 40-50 cards in a category.

Resources:

Kauffman, Draper, Jr. *Teaching the Future: A Guide to Future-Oriented Education*. Palm Springs, CA: ETC Publications, 1976.

Kurtzman, Joel. *Futurcasting: Charting Your Way to the Future*. Palm Springs, CA: ETC Publications, 1985.

Naisbitt, John. *Megatrends: Ten New Directions Transforming Our Lives*. New York: Warner Books, 1983.

TREND CATEGORIES AND EXAMPLES

Symbols	Categories	Examples
1. COM	COMMUNICATION	Artificial Intelligence Automation Computers Space Satellites Television
2. NAR	NATURAL RESOURCES (Non-Fuel/Energy)	Air Endangered Species Land Water Weather/Climate
3. ENY	ENERGY RESOURCES	Coal Gas Geothermal Nuclear Oil Solar Synthetic
4. FAM	FAMILY LIFE	Contraception Fertility Marriage Patterns Size
5. FOA	FOOD AND AGRICULTURE	Arable Land Crop Yields Diet Drought Fertilizers Malnutrition Starvation
6. HEL	HEALTH	Alcoholism Cancer Drug Addiction Epidemics Heart Disease Infant Mortality Mental Health Pharmacology
7. HOM	HOMES AND HOUSES	Architecture Building Materials Condos and Townhouses Mortgages Robots

Symbols	Categories	Examples
8. COT	COMMUNITIES	Demographics New Cities/Towns Open Space Communes Urbanization Voluntary Simplicity
9. VAL	VALUES, ATTITUDES, LIFESTYLES	Alienation Boredom New/Old Values New Age Religions Privacy Racism Sexism
10. TRN	TRANSPORTATION	Air Travel Bicycling Buses Electric Cars Monorails Space Travel Speed
11. WRK	WORK AND LEISURE	Automation Avocations Consumerism Occupations Quality of Life Quality of Goods Unemployment
12. GOV	GOVERNMENT AND ECONOMY	Crime Critizenship Inflation Police Power U.S. Debt Welfare
13. EDU	EDUCATION	Careers Deschooling Special Needs Students Teachers Technology Unions
14. INT	INTERNATIONAL AFFAIRS	Development Population Rich/Poor Nations Terrorism United Nations War Weapons

11. A PROBLEM-SOLVING FORMAT

Introduction:

This lesson combines divergent thinking exercises with a structured format for analyzing complex situations. Students begin by reading a general description of a situation. Next, they work in groups to research the topic by collecting information from current media. After the research phase, students brainstorm specific problems arising out of the scenario and identify one fundamental problem. Solutions to that problem are then brainstormed. The best solution is determined through a screening process and is further elaborated. Finally, students present their solution to the class.

Overall, the intent is to encourage students to apply research skills to a specific area, then to develop novel methods of dealing with problems after a factual base has been established. Encourage divergent problem identification and solution. Caution students that throughout the process, they should search for humane solutions to the problems. Problem solving is a people-centered activity.

Objectives: Students will be able to:

1. Use a systematic method for defining and attacking a complex problem.

2. Plan a persuasive presentation of their solution to the problem.

Grade Level: 7-12

Teaching Time: 4-5 class periods

Materials: Copies of Handout 11-1 for all students; multiple copies of Handout 11-2 (optional); copies of teacher-prepared scenario

Procedure:

1. Develop a general description of a current or future scenario (some examples of scenarios are provided in Lessons 25-28). The scenario may indicate some specific problems to be considered, but ideally it will be open-ended enough to allow students to identify and grapple with problems they find central to the situation.

2. Divide the class into groups of four to six. Pass out the scenario. Allow 10-15 minutes for students to read the material. Then pass out Handout 11-1 and explain the process. On the handout have students write in the due dates for completion of each step.

3. Provide the balance of the first class period for groups to discuss the scenario and plan their research.

4. Allow one class period for groups to gather background information on the scenario. Provide some guidance to probable sources of information and location of items in the library. For younger classes, a bibliography of specific items to be read might be provided. Reconvene shortly before the end of the period to answer general questions and to outline the next day's plan. Class time may be reduced by assigning all research activities as homework, although using class time will allow the instructor to help students with specific problems.

5. Discuss brainstorming techniques as listed on Handout 11-1, and then break the class into groups. To insure that each group has completed steps 1-3 by the end of the period, allow 15 minutes for step 1, 5 minutes for step 2, and 15 minutes for step 3.

6. At the beginning of the next class period, tell students that steps 4-6 will be completed that day. (Criteria for evaluation of the solutions may be developed by the instructor to save time, or they may be brainstormed by the groups themselves.) In completing steps 4-6, the evaluation grid is filled in to determine the best solution. Each group then writes a more elaborate explanation of their solution, including who will do the recommended action; what will be done; where it will be done; when it will happen; how it will be done; how it will be financed; how it will remedy the problem situation. Finally, each group will prepare a five-minute presentation to be given the next day. The presentation should attempt to sell the group's solution to the class.

7. Have groups make their presentations. If you wish, students can use Handout 11-2 to evaluate other groups' presentations. The entire class could then use the evaluations to select the "best" solution presentation.

Resources:

Fitch, Robert M., and Cordell M. Svengalis. *Futures Unlimited: Teaching About Worlds to Come*. Washington, DC: National Council for the Social Studies, Bulletin 59, 1979.

Kurtzman, Joel. *Futurcasting: Charting Your Way to the Future*. Palm Springs, CA: ETC Publications, 1985.

Taylor, Paula. *The Kids' Whole Future Catalog*. New York: Random House, 1982.

PROBLEM-SOLVING STEPS

Step 1: Research and Problem Identification

Read the scenario carefully. Gather information about the general situation described in the scenario. In your group, brainstorm 10-15 problems that you think might arise from the scenario. Pick a recorder to write down the ideas. Use the rules of brainstorming.

Rules for Brainstorming
1. Say anything that comes to mind.
2. Piggybacking on the ideas of others is good.
3. Don't evaluate or criticize what others say.
4. When you can't think of anything else, wait a minute and try again.

Due date: _____

Step 2: Central Problem Identification

Review your list of problems. Imagine you can solve only one of them. Which problem would have the greatest impact on the overall situation. Your group will focus on that problem. Write out exactly what the problem is. Include these factors: Who, or what, is the problem? Where is the problem occurring? When is the problem occurring? Why is it a problem?

Due date: _____

Step 3: Solutions

Brainstorm 15-20 solutions to the central problem you identified in Step 2. Think of as many types of solutions as possible--economic, political, mechanical, philosophical....

Due date: _____

Step 4: Evaluation of Solutions

To measure the quality of your solutions, you must develop some means of determining exactly what makes up a good solution. These measurements of quality, or criteria, will enable you to select the solution that best addresses the central problem.

Choose FIVE criteria carefully so that you are really measuring an aspect of the solution that is relevant to the problem. For example, if you were buying a car, your criteria might be:

Which car:
1: Is least expensive?
2. Is a two-door?
3. Is my favorite color?

You could take this list to each car dealer and check each criterion against each model. The car that had the most positive checks would be the best car for you to buy.

Write your criteria here:

1.

2.

3.

4.

5.

Write ten of your best solutions in the evaluation grid below. Across the top of the grid, write in the criteria.

Evaluation Grid

SOLUTIONS	CRITERIA #1	#2	#3	#4	#5	TOTALS
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						

Beginning with the first criterion, decide which solution fits that criteria best--give it a rating of 10. Give the worst solution a rating of 1. Rate the rest of the solutions somewhere within this range. Do not duplicate your ratings; that is, within a criteria column, only one solution can have a rating of 3, etc. Go on to the next criterion. After you have evaluated all solutions for all criteria, total the rows to the right. The solution with the highest total is the best solution according to your criteria.

Due date: _____

Step 5: Describing the Best Solution

Each team member should write a three-paragraph elaboration of your best solution. Include an explanation of who will do the action; what will be done; where it will be done; when it will happen; how it will be done; how it will be financed; how this solution will remedy the problem.

Due date: _____

Step 6: Solution Presentation

Assume that your group has been called before the United Nations (or some other appropriate body) because of newspaper reports that you have developed a wonderful solution to a very serious problem. Your task is to make a five-minute presentation to the class (the United Nations) that will demonstrate the superiority of your plan.

Include in your presentation:

1. A statement of the problem you are solving.

2. A statement of the solution you are proposing.

3. Charts, photos, drawings, and/or dramatizations to convince them that you have the best answer.

Due date: _____

SUGGESTED EVALUATION CRITERIA FOR SOLUTION PRESENTATIONS

Group #_____

Overall Rating: Poor____ Fair____ Good____ Excellent____

1. How creative was the solution?	1	2	3	4	5
2. How well did the presentation address the identified problem?	1	2	3	4	5
3. Did all members participate?	1	2	3	4	5
4. How persuasive was the presentation?	1	2	3	4	5
Total					

PART III

FUTURES ISSUES AND TOPICS

12. FORECAST 2000

Introduction:

This lesson is actually a collection of five period-length activities derived from the same source, *Forecast 2000*, published in 1984. Written by George Gallup, Jr. (with William Proctor), the book summarizes the results of a poll of 1,346 "national opinion leaders." The authors identified ten "future forces" that those polled thought would influence national and world events over the next 16 years: (1) wars, terrorism, and the nuclear threat; (2) overpopulation; (3) economic pressures; (4) double-sword of technological progress (i.e., technological solutions to current problems inevitably create new problems); (5) environmental emergency; (6) crime and violence; (7) the faltering family; (8) high hope for good health; (9) prognosis for American politics; and (10) education and religion.

The Appendix to the book presents a number of tables recording the questions and responses that comprised the poll. The set of activities that follows is based on these tables but, for pedagogical reasons, does not contain all questions in the survey, nor all categories of responses, nor complete data and numbers. For the teacher, it would be most useful to have a copy of the book handy for preparatory reading and use in class when doing the lessons.

The teacher may find it expedient to use only one or a few of the five activities.

Objectives: Students will be able to:

1. Rank serious problems facing U.S. society today and in the year 2000.

2. Determine how life in the U.S. in the year 2000 will differ from life today.

3. Determine how life in the world in the year 2000 will differ from life today.

4. Decide how to improve U.S. society in the next 15 years.

5. Decide how to improve world society in the next 15 years.

6. Decide how individuals can prepare themselves for the future.

7. Choose current trends that seem to be encouraging.

8. Decide if he/she is optimistic or pessimistic about the future of the U.S. and the world.

9. Compare his/her choices and total class choices with those of the 1,346 national opinion leaders in the Gallup poll.

Grade Level: 10-12

Teaching Time: 5 class periods

Materials: Copies of Handouts 12-1 through 12-6 for all students

Procedure:

1. Explain to students that they are going to be working with some questions that were asked to important national leaders. The questions, which were part of a Gallup Poll, were designed to find out what the leaders thought life would be like in the United States and the world in the year 2000.

2. Distribute Handout 12-1, which contains questions 1 and 2 from the poll. Ask each student to first respond to question 1 by marking a "T" (for "Today") in the Q1 column in front of five (only) items. Point out that both questions 1 and 2 focus on U.S. society. Give the class about 5-10 minutes for this question. Then ask them to do the same for question 2, using the second column of blanks, but this time using an "F" (for "Future") as the check mark. Again, they should mark just five choices. Allow about 5-10 minutes for students to complete question 2. While the students are doing these two questions, the teacher should copy the grid from the handout on the chalkboard, as shown below:

	Q1	Q2	Poll Rank 1	Poll Rank 2
A.				
B.				
C.				
D.				
etc.				

3. When the students have completed their individual choices for both questions 1 and 2, ask for a show of hands for students choosing item A for question 1 (a "T" for "Today"); record the total number of hands by A beneath Q1 on the chalkboard. Do the same for items B-O for column Q1. For the five items with the highest tallies, ask the class to justify the item's seriousness to U.S. society. Repeat this process for Question 2, recording the number of "F's" for each item, A-O. Again, ask the students to justify the five choices with the highest tallies.

4. Finally, using Handout 12-6 as your source (but not distributing it to students), record the rank order of items chosen in the actual poll for questions 1 and 2. Now ask the class how their results for the first two questions compare with those of the poll's respondents. Where there are "extreme" differences, see if the class can explain why these occurred. Did any single student's choices correspond exactly (or closely) to those of the national opinion leaders?

5. Distribute Handout 12-2, which contains questions 3 and 4. Use the same procedure as you did for questions 1 and 2. Point out, however, that the students should use an "H" for "Here in the U.S." and a "W" for "World"; be sure students understand that the time frame for both questions is the year 2000. Remember not to pass out Handout 12-6 during this activity, but to use it yourself for recording the opinion leaders' rankings on the chalkboard.

6. Pass out Handout 12-3, which contains questions 5 and 6. Again follow the sequence described above. Students again use "H" and "W" to mark their answers; the time frame is the next 15 years.

7. Distribute Handout 12-4, which contains only question 7. Again follow the sequence described above, but encourage students to add their own ways of preparing themselves for the future on lines K-O.

8. Pass out Handout 12-5, which contains questions 8-10. For these three questions, follow the sequence you used for previous questions, again encouraging the students to list their own observed trends for question 8 on lines K and L. See if there are any key differences between the class percents (convert the tallies to percents) on questions 9 and 10, such as "Optimistic" for U.S. and "Pessimistic" for World. Distribute Handout 12-6 and discuss the opinion leaders' responses to questions 8-10.

Resources:

Barney, Gerald D. *The Global 2000 Report to the President*. New York: Penguin, 1980.

Gallup, George, Jr., and William Proctor. *Forecast 2000: George Gallup, Jr. Predicts the Future of America*. New York: William Morrow and Co., 1984.

Kahn, Herman. *The Coming Boom*. New York: Simon and Schuster, 1982.

Naisbitt, John. *Megatrends: Ten New Directions Transforming Our Lives*. New York: Warner Books, 1983.

O'Neill, Gerard K. *2081: A Hopeful View of the Human Future*. New York: Simon and Schuster, 1982.

POLL QUESTIONS 1 AND 2

1. Which five of the following do you regard as the most serious problems facing the United States today? In checking your five choices, use the mark, "T" (for "Today"). Write your answers in Column Q1.

Q1	Q2	Poll Rank Q1	Poll Rank Q2	
___	___	___	___	A. Narcotics
___	___	___	___	B. Government Reform
___	___	___	___	C. Inflation
___	___	___	___	D. Overpopulation
___	___	___	___	E. Threat of Nuclear War
___	___	___	___	F. Drug Addiction
___	___	___	___	G. Unemployment
___	___	___	___	H. Decline in Job Productivity
___	___	___	___	I. Crime/Lawlessness
___	___	___	___	J. Racial Tensions
___	___	___	___	K. Terrorism
___	___	___	___	L. Ecological/Environmental Problems
___	___	___	___	M. Educational Problems
___	___	___	___	N. Decline in Family Structure
___	___	___	___	O. Decline in Honesty/Ethical Behaviors/Morals

2. In column Q2, check those five problems you think are likely to be the most serious in the United States in the year 2000. In making your choices, use an "F" (for "Future"). These five choices may or may not be the same as those you selected for question 1.

POLL QUESTIONS 3 AND 4

3. In what five ways do you think life in the United States in the year 2000 will differ from life today? In choosing five items from the following list, use the mark "H" (for "Here"). Mark your answers in column Q3.

Q3	Q4	Poll Rank Q3	Poll Rank Q4	
___	___	___	___	A. More Pollution
___	___	___	___	B. Greater Use of Computer Technology
___	___	___	___	C. More International Interdependence
___	___	___	___	D. Greater Threat of War/Nuclear War
___	___	___	___	E. More Older People
___	___	___	___	F. More Automation
___	___	___	___	G. Lower Standard of Living/Quality of Life
___	___	___	___	H. More Advanced Technologies
___	___	___	___	I. More Impersonal/Regimented Living
___	___	___	___	J. More Advanced Health Care
___	___	___	___	K. More Crowding/Overpopulation
___	___	___	___	L. Less Energy/Natural Resources

4. In column Q2, mark the five items you think will best characterize how life in the world in the year 2000 will differ from life today. In making your choices, use a "W" (for "World").

POLL QUESTIONS 5 AND 6

5. What five programs or plans should be undertaken to improve U.S. society during the next 15 years? In making your five choices, use the mark "H" (for "Here"). Mark your answers in column Q5.

Q5	Q6	Poll Rank Q5	Poll Rank Q6	
___	___	___	___	A. Effective Crime Prevention
___	___	___	___	B. Birth Control/Family Planning
___	___	___	___	C. Improve Quality of Education
___	___	___	___	D. Nuclear Disarmament
___	___	___	___	E. Improve Health Care
___	___	___	___	F. Return to Previous Morals/Values/Ethics
___	___	___	___	G. Improve Environment
___	___	___	___	H. Create Jobs
___	___	___	___	I. Development of Alternative Energy Sources
___	___	___	___	J. Economic Stability
___	___	___	___	K. Energy/Resources Conservation
___	___	___	___	L. Improve Productivity

6. In column Q6, mark five programs or plans you think should be undertaken to improve world society during the next 15 years. In making your five choices, use the mark "W" (for "World").

POLL QUESTION 7

7. What steps should individuals take to prepare themselves for the future? Choose five from the following list, or state your own preferred steps on the blank lines.

Q7	Poll Rank	
___	___	A. Financial Planning
___	___	B. Be Open-Minded
___	___	C. Better/More Education
___	___	D. Work Hard
___	___	E. Learn About World/Issues
___	___	F. Honesty/Morality
___	___	G. Be Satisfied with Less
___	___	H. Become Self-Reliant
___	___	I. Protect Health/Stay Healthy
___	___	J. Increase Vocational Skills
___		K. _____
___		L. _____
___		M. _____
___		N. _____
___		O. _____

POLL QUESTIONS

8. Are there any developing trends in society today that you regard as encouraging? Choose at least one, but not more than five, from the following list, or state your own on the blank lines.

Q8	Poll Rank	
___	___	A. Quality of Youth
___	___	B. Education
___	___	C. Ecology Movement
___	___	D. Reduced Government Spending
___	___	E. Awareness of/Emphasis on Health
___	___	F. Awareness of World Problems/Relations
___	___	G. Attempts to Deal with Problems
___	___	H. Individual Responsibility
___	___	I. Awareness of Nuclear Threat
___	___	J. None
___		K. _____
___		L. _____

9. Everything considered, would you say you are optimistic or pessimistic about the future of the United States? Choose one of the following, or state your position on the blank line.

Q9	Poll %	
___	___	A. Optimistic
___	___	B. Pessimistic
___		C. _____

10. Everything considered, would you say you are optimistic or pessimistic about the future of the world? Choose one of the following, or state your position on the blank line.

Q10	Poll %	
___	___	A. Optimistic
___	___	B. Pessimistic
___		C. _____

FORECAST 2000 POLL RESULTS

Question 1--Poll Results (Rank Order):

1. Threat of Nuclear War (E)
2. Crime/Lawlessness (I)
3. Inflation (C)
4. Unemployment (G)
5. Ecological/Environmental Problems (M)
5. Decline in Job Productivity (H)*

Question 2--Poll Results (Rank Order):

1. Threat of Nuclear War (E)
2. Overpopulation (D)
3. Crime/Lawlessness (I)
4. Ecological/Environmental Problems (L)
5. Educational Problems (M)

****

Question 3--Poll Results (Rank Order):

1. Greater Use of Computer Technology (B)
2. More Advanced Technologies (H)
3. More Automation (F)
4. More Crowding/Overpopulation (K)
5. Lower Standard of Living/Quality of Life (G)
5. More Impersonal/Regimented Living (I)*

Question 4--Poll Results (Rank Order):

1. More Crowding/Overpopulation (K)
2. Greater Threat of War/Nuclear War (D)
3. More International Interdependence (C)
4. More Advanced Technologies (H)
5. Lower Standard of Living/Quality of Life (G)

****

Question 5--Poll Results (Rank Order):

1. Improve Quality of Education (C)
2. Create Jobs (H)
3. Return to Previous Morals/Values/Ethics (F)
4. Economic Stability (J)
5. Energy/Resources Conservation (K)
5. Improve Health Care (E)*

*Same rank indicates a tie!

Question 6--Poll Results (Rank Order):

1. Birth Control/Family Planning (B)
2. Nuclear Disarmament (D)
3. Improve Quality of Education (C)
4. Improve Productivity (L)
5. Energy/Resources Conservation (K)

****

Question 7--Poll Results (Rank Order):

1. Better/More Education (C)
2. Learn About World/Issues (E)
3. Become Self-Reliant (H)
4. Financial Planning (A)
5. Increase Vocational Skills (J)

****

Question 8--Poll Results (Rank Order):

1. Awareness of Nuclear Threat (I)
2. Awareness of World Problems/Relations (F)
3. Education (B)
4. Individual Responsibility (H)
5. Ecology Movement (C)
5. Attempts to Deal with Problems (G)*

Question 9--Poll Results (Percents):

Optimistic = 54%
Pessimistic = 29%
Neither = 2%
Miscellaneous = 3%
Don't Know = 12%

Question 10--Poll Results (Percents):

Optimistic = 33%
Pessimistic = 29%
Neither = 5%
Miscellaneous = 4%
Don't Know = 16%
No Response = 14%

****

13. WARNING FUTURE GENERATIONS

Introduction:

Accumulation of nuclear waste products has generated several problems. The problem of how and where to store the materials has been addressed most seriously by the government. The debate on storage methods and locations continues, but a new concern has been raised. Even if storage containers and depositories are developed that are completely safe from the ravages of nature, how can they be made safe from the vagaries of humans?

This exercise asks students to create a sentry system designed to guard nuclear waste dumps from accidental compromise by human actions. The problem of designing a system that will last for 300 human generations will allow students to invent in the areas of linguistics, communication, architecture, art, and science.

Objectives: Students will be able to:

1. Create a system designed to warn humans of the dangers of exposure to nuclear waste.

2. Develop symbolic languages to communicate the dangers of exposure.

3. Create posters illustrating their physical plans and linguistic inventions.

Grade Level: 7-12

Teaching Time: 2-4 class periods

Materials: Copies of Handout 13-1 for all students, butcher paper, crayons, markers, dictionaries, thesauri

Procedure:

1. Divide the class into groups of four. These groups will remain together for the entire project.

2. Distribute Handout 13-1 and allow time for students to read the handout.

3. Answer questions about the assignment. Provide dictionaries and thesauri for reference materials and have students begin. The first day should be spent working on the linguistic aspects of the project.

4. During the second period, students should complete work on the linguistic project and begin brainstorming the monolithic aspects of their project. Encourage them to develop plans on scrap paper before moving to the large-scale posters.

5. In the remaining class periods, students should complete work on the posters. Hang the posters and have groups examine and attempt to interpret them. Conduct a discussion of the interpretations and have the class vote on the system that most successfully achieved its objective. During the debriefing, identify and discuss the ideas that worked the best to communicate the desired warnings.

6. You may want to send copies of the most successful design to the school newspaper or to the U.S. Department of Energy.

Follow-up:

Advanced classes might want to challenge the idea that warning systems have to follow the parameters provided. Let them explore other possibilities. They might also want to search for solutions to the underlying problem--the generation of nuclear waste--rather than deal with the symptoms.

Classes interested in the linguistic aspects of the project might write heroic legends that would contain warnings about the dangers of entering the disposal areas. These epics must be powerful stories to ensure that they impress the minds of future generations.

Resources:

Didsbury, Howard F., Jr. (ed.). *Communications and the Future*. Washington, DC: World Future Society, 1982.

Douglis, Carole. "Stone Sentry." *Omni*. Volume 8, November 1985.

Gannes, S. "Sentinels for a Nuclear Tomb." *Discover*. Volume 5, September 1985.

Herndon, James. *How to Survive in Your Native Land*. New York: Touchstone Books, 1977.

Holden, C. "Omens of Doom for Nuclear Waste Tomb." *Science*. Volume 225, August 3, 1984.

"Nuclear Legends." *Harpers*. Volume 269, October 1984.

"Warning Signals: How to Warn the 120th Century About Disposal Sites." *Time*. Volume 124, November 26, 1984.

WARNING FUTURE GENERATIONS

"How do you talk to the future? Signs rust, documents crumble, buildings fall, languages change. Yet the markers for nuclear waste must warn 300 future generations."

From Carole Douglis, "Stone Sentry" in *Omni*, November 1985, page 64.

Imagine that beneath mounds of earth, acres of radioactive soil have been fused into black glass. Tanks of spent nuclear power plant fuel and high-level defense waste lie buried in deep salt mines. Damage to the protecting layers of earth and salt could release dangerous levels of radioactivity into the ground and the atmosphere. Threats posed by natural disasters have been controlled by careful engineering. The sole remaining challenge to the safety of the depositories is . . . humankind.

Radioactive wastes can remain dangerous to life-forms for as long as 3 million years. Even if the physical structures designed to lock in the radiation last that long, how can future generations of curious humans be prevented from penetrating that protection? Warning signs rust away. Books turn to dust. Buildings collapse. Most dangerous of all, languages change.

How can the present communicate such an important message to the future? Researchers have identified four elements essential to an effective long-term warning system:

1. Inanimate objects must communicate a clear and urgent caution.

2. The message must be sent in more than one way: the more redundancy in the system, the lower the margin for error.

3. Warning markers must be of monumental scale. The markers must be made of some massive, hard-to-move chunks of very low-value material. The size and low value prevent the markers from being carted off for other uses. There must be more markers than appear necessary. This will insure that some markers will remain, even if many are destroyed by weather, quakes, war, or other human actions.

4. There must be written records and warnings. The warnings must be understandable even to the illiterate.

While the principles of monumental engineering have been well understood for centuries, the dynamics of languages are more difficult. Studies show that languages change over time. About 19 percent of the basic words of any language change every 1,000 years. After 5,000 years English readers would understand only about half of today's common words. In 10,000 years the percentage drops to about 12 percent. The problem is to construct warning signs that will continue to communicate the DANGER! message in ways that will not lose their meaning with the passage of time.

Your team has been selected to design the nuclear hazard warning system for the United States. Read the instructions on the next page very carefully!

Instructions for Warning the Future

1. *Create a language that will resist change for 300 generations. The most effective languages will use simple, clear icon symbols. These symbols must be understandable to all cultures. Cartoon-like drawings can be very effective.*

A. You must work with your group to devise a simple symbolic language that will be understandable to all people. Begin by generating a list of the words you think will be most important in your signs. Invent two or three different symbols for each word and then decide which best communicates the idea of each word.

B. Make a dictionary list on notebook paper. This will be turned in with your final packet.

C. Write *three different* warnings in your symbolic language.

D. Draw the three warnings on the poster paper.

E. Hang your poster on the wall. Do not translate your poster for any other team.

2. *Design a monumental warning system to carry your warnings. Remember to follow the four rules of design.*

A. Design a system of warning monuments to guard the depository. Be sure to include the locations of the warnings you have written in your symbolic language.

B. On the second sheet of poster paper, draw an aerial view of your monuments and a close up of one of the markers.

C. Hang your second poster next to your first one.

3. *Examine the posters from the other groups and try to decipher their symbols. Take notes on the systems that were the easiest to understand. What made the system work? Where was it weak? Which system do you think is most likely to last for 300 generations?*

Due Dates: Language Dictionary _____

Language Poster _____

Monument Poster _____

14. BRIDGING THE COMMUNICATION GAP

Introduction:

The "communication gap" is often cited as one of the major causes of misunderstanding between individuals, groups, and nations. As the world in which we live continues to grow smaller and more complex, the issues and problems that must be resolved call for unprecedented communication skills. The intent of this lesson is to provide students with an opportunity to identify key communication skills essential for bridging the "communication gap" and establishing positive interpersonal, intergroup, and international relations.

Objectives: Students will be able to:

1. Define the term communication gap as it relates to various communication environments.

2. Describe the key ingredients of the communication process.

3. Describe the major obstacles to successful communication.

4. Develop essential communication skills for communicating more effectively in a variety of communication environments.

Grade Level: 9-12

Teaching Time: 2 class periods

Materials: Copies of Handout 14-1 for all students, poster paper, markers, tape, chalkboard/overhead projector/transparency film

Procedure:

1. Ask students to define the term "communication gap." [The inability to communicate on a meaningful level because of some difference between the parties, for example age, sex, political orientation, religion] Ask students to give examples of communication gap problems that they have experienced with another person or, as a member of a group, with another group. Ask students to give examples of the communication gap problem at the international level.

2. Provide each student with a copy of Handout 14-1. Review the handout thoroughly, making the point that each individual repeats the process thousands of times each day. Make sure that students understand what is meant by sender and receiver and how a person plays both roles in the process of communicating.

3. Ask students to define what they think is meant by the concept of "noise" in the communication process. [Noise is anything that prevents the receiver from understanding the message as it was first formulated in the mind of the sender.] Differentiate noise in the channels and noise as a part of the selection and response functions. [Noise in the channel refers to externally produced problems such as inappropriate use of language, inattentiveness, not hearing, speaking softly, distractions, etc. Noise as part of the selection and response functions is internally produced such as stereotypes, prejudices, biases, etc.] Make sure that students understand that the communication gap is created by noise.

4. Organize students into small groups of not more than five persons each. Provide each group with poster paper and a marker. Ask groups to brainstorm examples of communication noise and to list their examples on the poster paper. You may need to remind students that noise can be created by both the sender and the receiver, as well as the environment, and is anything that prevents a message from being received as it was formulated in the mind of the sender.

5. Ask groups to share their examples. Make a master list either on the chalkboard or on an overhead projector. Identify the source of each noise: sender, environment, or receiver.

6. Ask groups to brainstorm characteristics of effective sending and effective receiving in an interpersonal setting. Lists should consist of no less than 8-12 items each. Ask students to report on their lists and make a master list.

Example Characteristics

Sending	**Receiving**
Speak clearly	Listen carefully
Use gestures	Ask for clarification
Establish eye contact	Establish eye contact
Get rid of distractions	Paraphrase

7. Ask groups to brainstorm characteristics of effective sending and receiving in an intergroup and international environment. Again, make a master list by compiling all the group lists.

8. Discuss the following questions with the class:

- In communicating with another person, which is more difficult--sending or receiving? Why?
- What noises are most destructive to intergroup communication? What do groups need to be able to do in order to more effectively communicate with one another?
- What noises are most destructive to international communication? What other problems do countries face as they attempt to resolve problems? What do countries need to be able to do in order to more effectively solve problems?

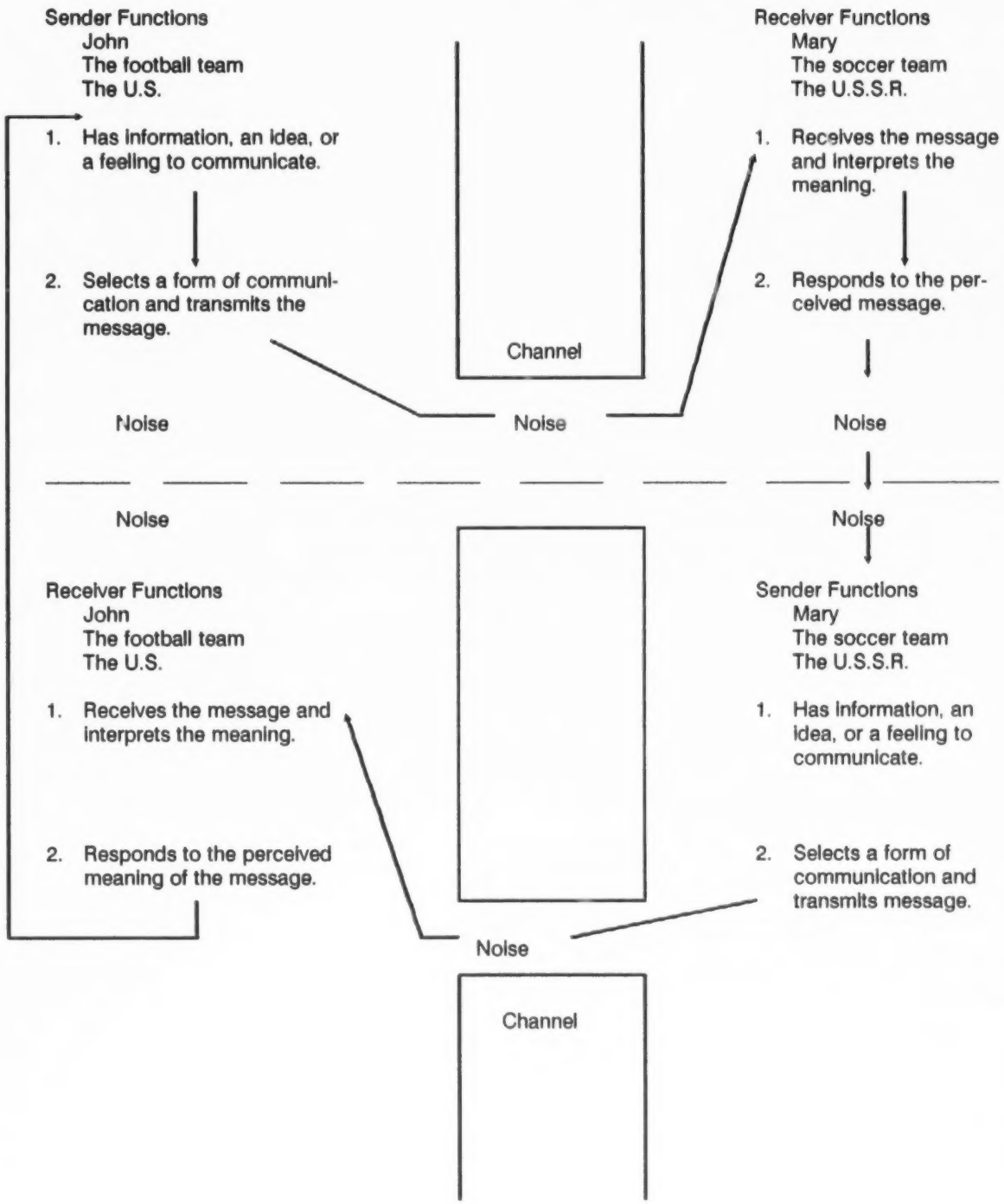
Follow-up:

This activity can be used in a variety of ways. Students completing the activity through step 5 listed above have generated a list of essential skills for interpersonal communication that might serve as good reminders for classroom communication.

Resources:

Didsbury, Howard F., Jr. (ed.). *Communications and the Future*. Washington, DC: World Future Society, 1982.

THE COMMUNICATION PROCESS



15. THE PROBLEM OF THE COMMONS

Introduction:

In a world of finite resources, restraint and/or cooperation on the part of individuals and nation-states may be the only means of maintaining and promoting the delicate balance and the unity of the world's ecosystem. This lesson is designed to help students explore the conflict between short-term growth and long-term conservation of resources. To be adequately prepared for this activity, the teacher may wish to gather some information on such topics as land use, deforestation, ocean use, and air and water pollution for use in illustrating the global reality of "The Problem of the Commons."

Objectives: Students will be able to:

1. Judge the value of cooperation in serving human needs.

2. Judge the validity of unrestrained self-interest in an interdependent world of finite resources.

3. Choose a position between short-term uncontrolled growth and long-term conservation of resources.

Grade Level: 9-12

Teaching Time: 2 class periods

Materials: Copies of Handouts 15-1 and 15-2 for all students

Procedure:

1. Divide the class into groups of from three to five students.

2. Distribute Handout 15-1 and ask students to read the scenario.

3. Ask every student to take and support a position on the question posed. After each student has reported his/her position to the small group, ask groups to attempt to reach consensus.

4. After the groups have discussed their positions and attempted consensus, post the responses (by group or individuals) on the board. The responses are to the question: Should Kartuny add another animal to the commons?

5. Following the posting of responses, ask students to generate a list of reasons for and against Kartuny's adding an animal to the commons. List these on the board.

6. Conclude this part of the activity with a discussion of the following questions:

- What does the problem of the commons have to do with you?
- Are you ever confronted with problems similar to the one faced by Kartuny? If so, what factors do you consider?
- Is your community, state, nation, or world faced with problems similar to that faced by Kartuny? Give examples and some of the responses generally given to these problems.
- What is the difference between self-interest or national interest and human interest? Give examples.
- Give an example of a short-term growth decision and a long- term conservation decision.
- What is the purpose of understanding "The Problem of the Commons"?

7. Distribute Handout 15-2. Ask students to read the scenario and respond to the following questions.

- What are some possible arguments for and against the resource use by the country presented in this scenario?
- If you were a citizen of a country that had 25 percent of the world's population and only 5 percent of its resources, how would you respond to the scenario presented in "The Problem of the Commons II"?
- As a citizen of the country presented in the scenario, how would you respond to the demand to reduce, share, or conserve resources?
- What type of world resource distribution model would you support?
- What are the lessons to be learned from the problem of the commons? How might you be personally affected by the lessons presented in this scenario?

Follow-up:

Have students collect personal, local, state, national, or global examples of short-term/long-term decision dilemmas for presentation to the class.

Resources:

Barnet, Richard J. *The Lean Years: Politics in the Age of Scarcity*. New York: Simon and Schuster, 1982.

Barney, Gerald D. *The Global 2000 Report to the President*. New York: Penguin, 1980.

Brown, Lester. *The Twenty-Ninth Day*. New York: W.W. Norton, 1978.

Brown, Lester. *Building a Sustainable Society*. New York: W.W. Norton, 1981.

Hardin, Garrett, and John Baden (eds.). *Managing the Commons*. San Francisco, CA: W.H. Freeman, 1977.

THE PROBLEM OF THE COMMONS I

Once there was a small pasture held in common by a village of cattle herders. Being rational beings, free and shrewd, they each sought to maximize their gains from pasturing their animals on the commons. Currently each herder had two animals grazing on the commons.

One day, a man named Kartuny began to think about increasing the number of animals he had grazing on the commons from two to three.

Should he?

THE PROBLEM OF THE COMMONS II

Once there was a small planet, the fate of which was held in common by a number of large and small nation-states. Being rational, free, and shrewd, the people of these nation-states sought to maximize their gains by utilizing the resources of the small planet to further each of their own particular ends.

The people of one particular nation-state, consisting of 5 percent of the planet's population, use 27 percent of the natural resources of the small planet. Should they?

E4

16. ENERGY RESOURCES

Introduction:

In 1973, the U.S. and other major users of oil and gas were shocked by the OPEC decision to limit production and raise the price of oil. For the first time, Americans were made aware that oil and gas were finite fossil fuel resources and that as they became scarcer, the prices of these fuels would rise. Today, oil and gas seem to be plentiful again, and prices are dropping or stable. This has not, however, changed the fact that sooner or later, we will have to face shortages and higher prices. The supply and demand of energy resources has become a major issue in American and world society. What is the nature of the problem, and what are some short-term and long-range solutions? These are the questions students address in this lesson.

Objectives: Students will be able to:

1. Explain why the energy issue is a national and world problem.

2. Make decisions on energy types for the year 2000, for the U.S. and the world.

3. Understand some of the implications of six issues involved in the world energy supply/use problem.

4. Determine priorities for a U.S. energy policy.

Grade Level: 7-12

Teaching Time: 3 class periods

Materials: Copies of Handouts 16-1 through 16-4 for all students

Procedure:

1. Give each student a copy of Handout 16-1, and ask them to complete this short, ten-item quiz. Tell the class this quiz is an "awareness" introduction to the issue, and will not count on their unit or course grades. When all students have finished the quiz, give them the answers to the items, and see if there are any items on which a majority of the class had incorrect answers. For these questions, provide some explanations. Answer any questions students may raise.

Answers to Quiz:

1 = C	6 = B
2 = C	7 = C
3 = C	8 = D, C, F
4 = D	9 = D
5 = A	10 = C

2. Next, pass out Handout 16-2. Form the class into small groups of three or four students each, and ask the groups to make judgments as to the pattern that might prevail in the year 2000. Tell them that their two columns for the year 2000 must each add up to 65 (barrels per day). Each group should be prepared to defend their numbers and pattern. After 20 or 30 minutes, have each group present their numbers and totals and justify their pattern. Using this same handout, conduct a discussion to make sure students understand the nature of the six issues listed at the bottom of the page.

3. Distribute copies of Handout 16-3. As springboards for discussion, pose the following questions relating to the information regarding the United States:

- How do you explain the differences in types of energy used in 1850 and 1900?
- Why did the use of oil increase so dramatically from 1900 to 1980?
- Why did the use of coal decrease between 1900 and 1980?
- What energy sources should be dominant in the year 2000?

4. Next, have each student, based on his or her preferences, fill in the blanks for "2000," making sure that the column adds up to 100 percent. When they have finished their allocations, choose a few to read off their numbers and explain their decisions.

5. Direct students' attention to the information on the world at the bottom of this same handout. Explain that most of the developing world cannot afford oil and natural gas, and thus these nations rely on wood and coal. Now have each student fill in the blanks for the year 2000, again making sure the column adds up to 100 percent. Again, ask for volunteers to read and justify their allocations.

6. Pass out or place on the chalkboard the list in Handout 16-4. Explain the nature of each policy. Then ask the students to rank the policy options in two ways: (1) according to which they think are preferable and (2) according to which they think are probable (i.e., feasible). Have them use the matrix at the bottom of the handout or place it on the chalkboard for them to copy. When all students have completed their matrices, determine the class average rankings for first, second, and third places under the two categories of "Preferable" and "Probable." Discuss the results, focusing especially on differences between the rankings in the two categories.

Resources:

Hayes, Denis. *Rays of Hope*. New York: Norton, 1977.

Lovins, Amory B. *Soft Energy Paths: Toward a Durable Peace*. New York: Harper and Row, 1979.

Miller, G. Tyler, Jr. *Energy and Environment: The Four Energy Crises*. (2nd ed.) Belmont, CA: Wadsworth, 1980.

Odum, Howard T., and Elisabeth Odum. *Energy Basis for Man and Nature*. New York: McGraw-Hill, 1981.

Stobaugh, Robert, and Daniel Yergin (eds.). *Energy Future*. New York: Random House, 1982.

Energy Quiz

1. How much more energy do you use than someone living in America 100 years ago?

_____ A. Twice as much

_____ B. Three times as much

_____ C. Four times as much

_____ D. Five times as much

2. Which nation in the world uses the most energy?

_____ A. West Germany

_____ B. Japan

_____ C. United States

_____ D. U.S.S.R.

3. The major source of the energy we in the United States use is:

_____ A. Coal

_____ B. Natural Gas

_____ C. Oil

_____ D. Wind

4. How much more energy does the United States use than a developing nation?

_____ A. Twice as much

_____ B. Three times as much

_____ C. Five times as much

_____ D. Ten to 100 times as much

5. The majority of the oil used in the United States is to:

_____ A. Power our automobiles

_____ B. Heat our homes

_____ C. Heat and cool offices

_____ D. Run manufacturing plants

6. The United States is:

_____ A. A major exporter of oil

_____ B. A major importer of oil

_____ C. Self-sufficient in oil

_____ D. Oil-rich and coal-poor

7. A conservative estimate is that all fossil fuels will be used up by _____ years from now.

_____ A. 50

_____ B. 100

_____ C. 500

_____ D. 1,000

8. At some point in the future, the U.S. will have to rely completely on renewable energy sources. Which of the following energy sources are renewable?

_____ A. Oil

_____ B. Sun/solar

_____ C. Water/tides

_____ D. Coal

_____ E. Natural gas

_____ F. Wind

9. The three nations with the largest reserves of coal are:

_____ A. Saudi Arabia, Indonesia, and India

_____ B. Mexico, Brazil, and South Africa

_____ C. France, Egypt, and Canada

_____ D. China, United States, and U.S.S.R.

10. Which one of the following nations is a net exporter (sells more than they use) of oil?

_____ A. United Kingdom

_____ B. Japan

_____ C. U.S.S.R.

_____ D. West Germany

U.S. ENERGY SUPPLY AND ENERGY ISSUES

(Millions of Barrels Per Day of Oil or Equivalent)

	1975		1990		2000	
DOMESTIC SUPPLY	28		36		??	
Oil		10		10		??
Natural Gas		9		9		??
Coal		7		12		??
Nuclear		1		3		??
Solar and Hydroelectric		1		2		??
IMPORTED SUPPLY	9		15		??	
Oil		9		14		??
Natural Gas		0		1		??
CONSERVATION	0		3	3	??	
TOTAL SUPPLY/USE/NEED	37	37	54	54	65	65

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Energy Issues

1. Expanding use versus dwindling supply
2. Renewable sources versus non-renewable sources
3. Relative scarcity versus rising/falling price
4. Expanding uses versus conservation
5. Uses versus social costs (e.g., pollution, wastes)
6. Lifestyles 1980 versus lifestyles 2000

Sources of Energy Used: United States and World

United States

1850		1900		1950		1980		2000	
Coal	9%	Coal	73%	Coal	38%	Coal	19%	Coal	___
Wood	91%	Wood	18%	Wood	0%	Oil	49%	Oil	___
		Oil, Natural Gas and Hydropower	9%	Oil, Natural Gas Hydropower	57% 5%	Gas Hydro	26% 3%	Gas Hydro	___ ___
						Nuclear	3%	Nuclear	___
								Wood	___
								Solar	___
								Conservation	___
	100%		100%		100%		100%		100%

****

World

1980		2000	
Wood	20%	Wood	___
Coal	28%	Coal	___
Gas	15%	Gas	___
Oil	35%	Oil	___
Hydro	2%	Hydro	___
		Nuclear	___
		Solar	___
		Conservation	___
	100%		100%

U.S. ENERGY POLICY

Suggestions for U.S. Energy Policy

1. Make utility (gas, oil, electricity) prices reflect real costs.
2. Develop alternative energy sources and uses, and create demonstration projects (solar homes, windmills, electric cars, nuclear fusion, etc.).
3. Increase the limits and costs of pollution to industry and to consumers.
4. Rely more on coal than oil and gas.
5. Require more built-in conservation in new houses, factories, and appliances.
6. Increase conservation education efforts.

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Ranking The Six Policy Options

Rank the six policy suggestions above according to which you think is most preferable. Then rank them according to which is most probable (most likely to happen). Use the numbers in front of the policies to fill in the blanks.

Rank	Preferable	Probable
1st	_____	_____
2nd	_____	_____
3rd	_____	_____
4th	_____	_____
5th	_____	_____
6th	_____	_____

17. THE SHAPING OF MY GENERATION

Introduction:

This lesson is an open-ended assignment in which students assess the importance of certain events during their lifetime by interviewing their parents and other adults. Students (and their parents) speculate about the impact these events will have on their adult lives. To conclude the lesson, students collect newspaper articles and other evidence as additional indicators that support their parents' responses.

Objectives: Students will be able to:

1. Collect data using interviews.

2. Synthesize data into a summary report.

3. Identify several key events that they think will have a significant impact on their lives.

4. Find current news articles that support their findings.

Materials: Videotape recorder or audiotape equipment (optional)

Grade Level: 7-12

Teaching Time: 1-1 1/2 class periods, plus homework

Procedure:

1. To introduce this lesson, divide the class into groups of four or five students. Allow students five minutes to brainstorm a list of what they consider to be the most important events that shaped their parents' generation. To provide more direction, explain that these events probably occurred during their parents' teenage or young adult years. These events should be historical or social; they may have occurred within the United States or internationally. As they begin this part of the activity, teachers may wish to allow students several minutes to skim the last two or three chapters of an American history textbook.

2. Compare group responses. Were certain events mentioned more frequently than others? Which ones? Are they cited in the American history textbook? [Possibilities include space exploration, Vietnam war, protest movements, Watergate, civil rights movement, Peace Corps, political assassinations.]

3. Compile a class list of the events that were mentioned most frequently. As a brief homework assignment, students should be encouraged to discuss the class results with their parents or other adults.

4. Students should now be prepared to develop a list of the events that they think have already begun to shape their generation. Explain to students that their history textbook is probably not the best resource for this assignment. Students should conduct informal interviews with their parents or other adults, including teachers, to obtain the data they need. Students may wish to conduct interviews using video- or audiotape equipment.

6. To get students started, ask them to consider using some of the questions listed below:

- In what ways does my generation differ from yours? How is our society different? the world? Are attitudes different? In what ways?
- What similarities do our generations share? Do we have the same expectations? Similar goals?

- What important issues do you think my generation will be most concerned about? What are the indicators of these issues today?
- What problems do you think my generation will face? In what ways might they be unique to my generation?

7. When students have completed their interviews, discuss their findings in class. Ask students how accurately they--the younger generation--identified what their parents might consider to be the most important events that shaped their generation. What similarities and differences between generations did their parents see? What important issues do students see ahead?

8. As an ongoing homework or library research assignment, students should collect news articles that support the responses of their parents and other adults. Teachers may choose to make this a structured writing assignment.

Resources:

Yankelovich, Daniel. *New Rules*. New York: Random House, 1981.

18. FOOD: HUNGER AND STARVATION

Introduction:

All human beings need certain inputs in certain quantities to physically survive. The basic nutritional needs are (1) water (H_2O), (2) oxygen (O_2), (3) minerals (e.g., iron), and (4) foods with proteins, carbohydrates, lipids (fats), and vitamins. When food is eaten, it is converted into essential building-blocks of life, among which are calories and proteins. Although the body needs minimum amounts of all nutrients, two crucial measures are the amounts of calories and proteins. For adults, the minimum numbers of calories per day are 3,000 for men and 2,200 for women; the minimum amount of protein per day is about 60 grams.

The result of inadequate and/or insufficient intake of essential nutrients is malnutrition, which over time leads to starvation and death. What is the extent of hunger and malnutrition in the world? There are many estimates (counting is a problem in many areas of the world), but most experts place the figure between 10 and 20 percent of the Earth's population. In 1986, the world population reached the 5 billion mark, meaning that 500 million to 1 billion people are hungry and/or malnourished. It is safe to claim that at any moment in the present, 100 million people (and perhaps as many as 500 million) are threatened with death due to starvation. Of these, 10 million or more are children. Approximately 10,000 to 15,000 persons each day die of starvation.

Where are hunger and starvation most serious? There is adequate daily calorie intake in almost all of Europe, North America, and Oceania. Calorie intake is adequate in more than 90 percent of South America. Calorie deficiencies exist in much of Asia, Africa, Central America, and the Near East.

This lesson focuses student attention on the many issues surrounding hunger.

Objectives: Students will be able to:

1. Describe the world food problem.

2. Understand the relationships between food and life expectancy, and between food and infant mortality.

3. See relationships among clean water, waste disposal, life expectancy, and infant mortality.

4. Choose among policy options for increasing food production and for providing foreign aid.

Grade Level: 7-12

Teaching Time: 2 class periods

Materials: Copies of Handouts 18-1 through 18-3 for all students

Procedure:

1. In order to get the class thinking about food, hunger, and starvation, ask them their opinions on the following questions:

- Why do more than 12,000 people in the world die each day of hunger and starvation?
- Why do you think the life expectancy at birth in the United States is 75 years, while in Afghanistan it is 37 years?
- About how many calories do you consume each day?
- What is the relationship between grain and such foods as beef, pork, and chicken? [These foods come from animals that are fed and grow on grains.]

- What types of foreign aid would be most helpful to nations that suffer most from hunger and starvation?

2. Pass out Handout 18-1, and ask each student to use the data to answer the following questions:

- Which nation has the highest infant mortality rate? [Afghanistan] Which has the lowest? [Canada]
- Which nations do not have an average daily per capita supply of calories that is sufficient? [Afghanistan, Angola, Bolivia, Chad, India, Nepal, and Yemen] What continents are represented by these nations? [Asia, Africa, and South America]
- Which nations appear to have plenty to eat? [Austria, Canada, Czechoslovakia, Indonesia, Italy, and the United States] Except for one nation, these nations represent what continents? [Europe and North America]
- Using only the data in this table, in which nation would you prefer to live? [Canada] In which nation would you least like to live? [Afghanistan]
- In which nations would you expect the "most" (as percent of population) hunger and starvation? [Afghanistan, Angola, Chad, and Yemen]
- What reasons can you hypothesize cause a low life expectancy at birth? What are the causes of a high infant mortality rate?

3. Give each student a copy of Handout 18-2. Explain the relationship of water supply and waste disposal to health, especially for young children (those less than one year old are most affected by these factors). Next, ask the students the following questions based on the data in this table:

- In which two nations is there abundant clean drinking water? [United States and Chile] In which nations do less than half the population have access to clean water? [Bolivia, Ethiopia, Honduras, India, Indonesia, and Pakistan]
- In which nations is there almost universal human waste disposal? [Costa Rica, Cuba, U.S.S.R., and the United States] In which nations do less than one-fourth of the population live where there is human waste disposal? [Bolivia, Ethiopia, Honduras, India, Indonesia, Pakistan, and Turkey]
- In which three nations are children most at risk due to lack of cleanliness in their environment? [Ethiopia, Indonesia, and Pakistan]

4. Distribute Handout 18-3. Form small discussion groups of three or four students each, and then have each group decide on one policy from each of the two lists. Each group should prepare to justify its two choices. Give the groups about 30 minutes to complete this task. Then have each group state its two choices and present a justification for them.

Resources:

Brown, Lester R. *State of the World: 1986*. New York: W.W. Norton, 1986.

Callendo, Mary A. *The Nutrition Crisis: Alternatives for Change*. New York: Macmillan, 1979.

Lappe, Frances M., and Joseph Collins. *Food First: Beyond the Myth of Scarcity*. New York: Ballantine, 1981.

Newland, Kathleen. *Infant Mortality and the Health of Societies*. Washington, DC: Worldwatch Institute, 1981.

The Hunger Project. *Ending Hunger*. New York: Praeger, 1985.

United Nations Children's Fund. *State of the World's Children: 1985*. New York: Norton, 1985.

SOME INDICATORS OF HEALTH
(1981 DATA)

Nation	Life Expectancy at Birth	Infant Mortality Rate Per 1,000 Live Births	Daily Per Capita Calorie Supply As Percent of Need
Afghanistan	37	205	73
Angola	42	152	83
Austria	73	13	135
Bolivia	51	129	87
Canada	75	10	127
Chad	43	146	74
Czechoslovakia	72	17	141
India	52	121	87
Indonesia	54	105	110
Italy	74	14	150
Nepal	45	148	86
United States	75	12	139
Yemen	43	190	76

AVAILABILITY OF CLEAN DRINKING WATER AND HUMAN WASTE DISPOSAL (Percent of Population with the Service)

Nation	Water Supply	Waste Disposal
Brazil	55	25
Bolivia	37	24
Chile	85	32
Costa Rica	72	97
Cuba	72	97
Ethiopia	16	14
Honduras	44	20
India	42	20
Indonesia	22	15
Mexico	57	28
Pakistan	34	6
Philippines	51	56
Turkey	78	8
U.S.S.R.	76	92
U.S.	99	99

FOOD PRODUCTION AND FOREIGN AID

Suggested Ways to Increase Food Production:

1. Modern technology provides the best way to grow more food in less developed nations.
2. Promoting cultural and educational change is the best way to get more people to get more from the land.
3. Promoting political change is the best way to get more land in the hands of peasants who will then produce more food.
4. Organic methods rather than high technology and destructive fertilizers is the way to increased food production.

Choose one of the above policies: _____(number of policy)

****

Suggested Forms of Foreign Aid to Developing Nations:

1. Send food to the governments of developing nations.

2. Take and distribute food to the needy in developing nations.

3. Send funds to governments of developing nations without restrictions on its use.

4. Send funds to governments of developing nations earmarked for agricultural use only.

Choose one of the above policies: _____(number of policy)

19. THE HEALTH TECHNOLOGY REVOLUTION

Introduction:

Like many things in today's world, health technology is expanding at a dramatic rate. The once-fictional $6 million dollar man is now a near-reality. We speak regularly of organ transplants, artificial limbs and organs, and miracle drugs. We are entering a period of time characterized by a "if it wears out, get a new one" mentality. While few would argue against the health technology revolution, some would caution against moving too far without looking at both the benefits and the costs. The intent of this lesson is to provide students an opportunity to examine the advantages of modern health technology.

Objectives: Students will be able to:

1. List some of the modern advances being made in the field of health and medicine.

2. Understand that technological advancements must be viewed from both the cost and benefit perspective.

3. Argue the advantages or disadvantages of various health-related technological advancements.

4. Understand that a variety of perspectives are held on any issue and that any resolution of differences must be done through open discussion and communication of the perspectives.

Grade Level: 9-12

Teaching Time: 1-2 class periods

Materials: Poster paper, markers, masking tape

Procedure:

1. Ask students to give examples of modern health and medical technologies with which they are familiar. Choose two or three of the examples and ask students to discuss both the advantages and disadvantages of the technology. (You may need to assign students to review the field of health and medical technology before beginning the activity.) Ask students to discuss who decides whether a technological advancement is good or not good for society. Ask if anyone can think of a health or medical technology that was not good for society in general.

2. Give students the following information: Eternal life, long a cherished human dream, is beyond our reach. However, lives 20-40 percent longer than we're living now may soon be within our grasp. New antiaging drugs are now being developed and tested on laboratory animals at University College in London. The drugs create a loss of appetite and thus cut down food intake. The drugs also block enzymes called amylases. Amylases convert starch to sugar. An amylase-blocking agent would prevent a situation whereby the body does not use all the food ingested. Experiments with rats indicate that caloric restriction can double their life span. It is expected that by 1990, researchers will know whether the drugs will work for human beings.

3. Ask students to consider the implications of this research carefully. Ask students to give one advantage and one disadvantage of the antiaging drug. Divide the class into small groups of not more than five persons each. Provide each group with two pieces of poster paper and a marker. Ask the groups to list the advantages of the antiaging drug on one piece of the paper and to list the disadvantages on the other. Provide about 20 minutes for this portion of the activity.

4. After the groups have completed their lists, tape the lists to the wall. Ask each group to make a short presentation of the items on its lists. Then take down the lists and redistribute them among the groups, giving each group a set of lists developed by another group.

5. Ask the groups to review the lists and to draw a circle around those items that they disagree with. Once the lists have been reviewed, repost them. Ask each group to make a presentation of those items that they circled (disagreed with). After each item has been presented, allow for the group who originally authored the list to defend the item. Encourage a lively and spirited give-and-take.

6. After each group has made its presentation and made a defense, tell students that it is their responsibility to make a series of recommendations to the University College researchers about the antiaging drug. Solicit the recommendations from the class and list them on the board. Instruct the class to remember their discussion and debate of the advantages and disadvantages.

7. Following the development of the recommendations, discuss the following:

- How much should the public have to say about health and medical research today?
- How do you weigh the advantages and disadvantages of any scientific research?
- Are there any health and medical technologies that you feel are not in the best interests of human beings?
- What health and medical technologies do you think have been in the best interests of human beings?
- What health and medical technologies do you think will be developed in the next 20 years?

Follow-up:

If possible, have a physician and/or health and medical researcher visit the class. Pose the questions listed above to this person.

Resources:

Dunn, P.D. *Appropriate Technology: Technology With a Human Face*. New York: Schocken Books, 1979.

20. A HOUSE/A HOME

Introduction:

Shelter is one of humankind's most basic needs. However, the way in which this basic need is met differs dramatically across, as well as within, the many cultures of the world. The intent of this activity is to help students understand the various ways that people meet their housing needs and to predict how housing needs will be met in the United States in the future.

Objectives: Students will be able to:

1. Understand that the people of the world meet their basic needs of housing and shelter in a variety of ways.

2. Explain some of the reasons why housing differs in the world today.

3. Appreciate the high standard of housing in the United States today.

4. Project the style and function of housing in the United States in the future.

Grade Level: 9-12

Teaching Time: 1-2 class periods

Materials: 20 pictures representing different types of housing throughout the United States and the world (*GEO* and *National Geographic* are excellent sources for the pictures), world map

Procedure:

1. Collect at least 20 pictures of various cultural housing styles. Collect pictures that represent housing both in the United States and outside the United States. Assign a number to each picture and make a separate list of what each picture represents and where it was taken. Make sure that all descriptions of where the picture was taken and what it represents are removed from the pictures. Laminate the pictures if possible.

2. Begin the activity by discussing the following:

- If you were to make a list, what would be the essential features of the home in which you would prefer to live?
- How has housing design and function changed in your community in the past several years? Where are new houses being built? Is there any attempt to remodel old homes? Why?
- What values do home designs and building locations reflect about your community?
- Other than cost, what influences home style and site locations in your community?

3. Arrange students into small groups of not more than five persons each. Choose five or six pictures (representing the diversity in the world's housing) and give one picture to each group. Ask each group to determine where the picture was taken and why people would choose or have to live in the style of housing pictured. Rotate pictures until each group has had an opportunity to see all the pictures being used in the activity.

4. Collect the pictures. Display each picture, asking the groups to discuss their perceptions of where the picture was taken and why people would live in the type of housing pictured. Ask groups to give reasons or cultural clues for their responses. After hearing from all groups, locate the country or region of the world in which each of the pictures was taken on a large map of the world.

5. Discuss the following with students:

   - How do all the houses pictured in the activity differ from one another? How are the houses pictured in the activity similar?
   - What factors influence housing design and function the most?
   - Do you predict any changes in housing design and function for any of the regions identified in the pictures?
   - Do you predict any changes in housing design and function in your community in the next 20 years? Why or why not?
   - Given current trends in your community, where and what kind of house do you think will be available to you (if you stay in the community) in 20 years? Is there any difference between what you would like to have and what you think you might have? What, other than cost, is the difference?

Resources:

Sale, Kirkpatrick. *Human Scale*. New York: Putnam, 1982.

Schumacher, E.F. *Small is Beautiful: Economics as if People Mattered*. New York: Harper and Row, 1976.

Soleri, Paolo. *The Bridge Between Matter and Spirit Is Matter Becoming Spirit*. New York: Doubleday, 1973.

21. COMMUNITIES OF THE FUTURE

Introduction:

History books are filled with images of communities as the most important of social systems. By definition, communities are places where people depend on each other and organize their lives around common goals, needs, and interests. What concept of city will dominate our future? Will people view the community primarily as an economic and political unit, or will they feel a strong sense of belonging within some sort of geographic unit?

The traditional meaning of *a sense of community* is changing. Increasing numbers of people live in large metropolitan areas, move frequently, are geographically separated from their families, and spend their leisure time away from home and community. They take special classes, work at extra jobs, or pursue hobbies or sports in which they have invested a great deal of money. They may rarely discuss their work with family or friends because it is very routine or requires a great deal of technical knowledge.

How will such trends change the way people perceive and define community? Will communities be defined less by "a sense of place" and more by "common interests"? These are the questions students address in this lesson.

Objectives: Students will be able to:

1. Define *community* by analyzing a map illustrating participation in the community.

2. Develop a personal definition of *community* and compare it with the definitions of others.

3. Speculate about the importance of shared interests, rather than geography, as a force in determining the shape and organization of communities of the future.

Grade Level: 7-12

Teaching Time: 1-2 class periods plus homework

Materials: Poster paper, markers, tape

Procedure:

1. Ask each student to make a pictorial map or collage representing their community. Direct them to include home, school, places where they spend leisure time, places where they earn money, places where their parents work, shopping sites, homes of good friends and close relatives, special places they like to visit. Encourage creativity in images, graphics, and design. If you think it would be helpful, provide a wall map of the metropolitan area, region, or state to help students with scale and direction.

2. Students should then analyze their maps and write a statement about their community. Ask them to describe its size, shape, appearance, and the opportunities it presents. What do they like and dislike about their community?

3. To illustrate that people find *community* in different places and define *community* in different ways, ask students to compare their maps with their classmates'. This can be done in small groups or by posting the maps around the room and asking students to study the maps and make lists of the similarities and differences. As part of the large group discussion, ask students what geographic boundaries can be agreed upon. Do the boundaries of their map conform to those of the city? The metro area? What boundaries do they transcend in defining *community*? To what extent can students say they feel a sense of place? To make the concept of community more concrete, develop a composite

map in which the class weighs (+1, +2, etc.) the importance of specific places in establishing the identity of their community. What is important, and what is missing that is traditionally considered important to the community?

4. Continue the discussion by asking students to what extent they have defined *community* based on interests and experiences they share with others. What geographic boundaries can the class agree upon? Would they say they live in the same or different community than their classmates?

5. Explore what students think communities will be like in the future. Are their ideas about communities of the future based on a sense of place or on common interest? What are the advantages and disadvantages of each concept for defining communities of the future? Ask students to prepare written responses to these questions as a homework assignment.

Resources:

O'Neill, Gerard. *The High Frontier*. New York: Doubleday, 1982.

22. IMAGINE A GREAT COMMUNITY

Introduction:

Recently, much emphasis has been placed on the development of the community as a source of pride as well as opportunity. Many communities, in an effort to provide the best possible environment for both citizens and visitors, have actively sought to plan and initiate programs to best meet the economic, cultural, social, safety, transportation, and other important needs of the people. This activity intends to help students answer the question, "how can our community more adequately serve the needs of the people, both today and tomorrow?"

Objectives: Students will be able to:

1. Evaluate the strengths and weaknesses of the environment of their community.

2. Propose a community development plan to more adequately meet the needs of people living in and visiting their community.

3. Understand how planning and program initiation are conducted in their community.

4. Attempt to influence community development planning.

Grade Level: 9-12

Teaching Time: 4-5 class periods

Materials: Copies of Handout 22-1 for all students, poster paper, marking pens, tape

Procedure:

1. Distribute Handout 22-1. Ask students to read the article.

2. Organize students into small groups of four to five students. Provide each group with a piece of poster paper and a marking pen. Instruct each group to list 10-15 reasons why people would choose to live in or visit the community in which the students live.

3. Ask each group to present their list of community strengths. Encourage discussion and clarification. Post the lists after all presentations have been made.

4. Provide each group with another piece of poster paper. Instruct each group to list reasons why people would not choose to live in or visit the community in which the students live. Again ask each group to present their list of community weaknesses. Encourage clarification and discussion, posting the lists after all presentations have been made.

5. Synthesize the strength and weaknesses into two master lists.

6. Ask the groups to review the community strength master list. Assign each group the task of selecting one community strength. Once the selection has been made, inform the students that their group task is to design a way to make their particular choice a greater strength: how to make the strength even stronger; how it might get more attention or support; etc. Inform students that they will be responsible for making a group presentation of their idea. Encourage creativity and thoughtfulness.

7. Provide an opportunity for group presentations. If possible, invite key community members into the classroom to observe the presentations. Encourage group discussion and dialogue regarding the ideas.

8. Ask students to review the list of community weaknesses. Ask each student to complete the phrase "Our community could be a great community if . . ." Ask students to share their ideas. Group students with like ideas or concerns and instruct them to design a plan of action. Inform students that you would like them to present their "Great Community Action Plans" to both the class and to appropriate city officials or other persons.

9. Have students present their ideas to the class. Again, if possible, invite community members into the classroom to listen to the ideas.

10. Invite the mayor, city administrator, or a representative of the city into the classroom to discuss future city planning efforts and the process by which ideas become policy and reality. Have students submit a copy of their "Great Community Action Plans" to the city official and invite a response to the ideas. Conclude the activity with a discussion of the role of citizen input in making the community a better place for people to live and visit.

Follow-up:

If possible, arrange for students to present their ideas for community improvement directly to the city council or other official decision-making body in the community. Most city governments welcome students, especially if they have constructive ideas.

DENVER: IMAGINING A GREAT CITY*

By C.R. Hilliard

It has been one-and-a-half years since Federico Pena was elected mayor of the Queen City of the Plains, riding the crest of a slick campaign slogan.

"Imagine a Great City," the Pena banners encouraged.

"Imagine a Great City--and Go There," sarcastic nonbelievers replied.

But the slogan caught on, and after Pena was firmly seated in the big office in the City and County building, the theme lived beyond his election. Of course, there were still the nay-sayers, who observed that the city was already great and had been for more than one hundred years and didn't need some upstart mayor (who was not even a native, but hailed from Brownsville, Texas, for God's sake) to improve on it.

Nevertheless, the Urban Design Forum, an organization of forward-thinkers interested in preserving cities, chose "Ideas for a Great City" as the theme for its third Urban Design Symposium. Why not, the organizers asked, go to the public for its thoughts on what could make a good city great?

Philadelphia, for example, had halted urban decay in the sixties and was revitalizing itself. San Antonio had taken its river, a slow-moving stream about as wide as the average street, and turned it into a visual delight of shops and restaurants and parks. Detroit was coming back.

There was no reason why Denver (which is much younger than any of them) could not fight off what might not be blight but certainly was dullness, brought on by the flight to the suburbs and the increasing number of sprawling shopping malls outside the city.

First, residents had to take a look at what they already had. What they had, was, according to demographers, one of the nation's youngest major cities that had grown too fast. The metropolitan Denver area's population had climbed to more than 1.5 million by 1982, which was about triple the growth rate for the national average. The city was second only to Washington, DC, in the number of federal offices.

It has, as everyone knows, the U.S. Mint, which is the world's second-largest gold depository, if that counts for anything; a major military hospital is nearby, plus nine colleges and universities, and a State Capitol Building exactly one mile above sea level (at its front steps) with a dome covered with 250 ounces of 24-karat gold.

Its average temperature in January is 32.6 degrees Fahrenheit, and in July the average temperature is 74.4 degrees. It rains an average of 12.89 inches, and there is an average of 27.4 inches of snow.

That's about it. Oh, and a backdrop of mountains.

As a great city for hotels, it has a good start, and the same for office space, but . . . big buildings do not a great city make.

What does? A nationally known city planner, Edmund Bacon, told the symposium audience last May, "A city becomes great when its people begin aspiring to greatness."

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*From *Continental*, January 1985, pages 15, 16, 18. Reprinted by permission of the publisher.

From that emerged the Great City Ideas Campaign. (The symposium is an annual event "dedicated to examining where Denver is going as an environment that must be culturally and aesthetically livable as well as economically prosperous.")

The Forum solicited ideas for making a great city, and hundreds of suggestions were mailed in, some of them outrageous ("The Roller Mall," connecting all the buildings with a roller coaster, suggested by cartoonist Kenny Be), some of them innovative, some of them so simple that Forum officials wondered why nobody had thought of them before.

The first thrust of ideas arose from frustration stemming from the brown cloud of carbon dioxide, carbon monoxide, and dust particles kicked up by the commuter traffic flowing into the city from the suburbs. One citizen inquired about seemingly idle railroad lines. They already existed on north-south routes that run into the city along Interstate 25, he observed. The raillines pass through Union Station downtown, only a block or two from the bus terminal. Why not commuter rail lines?

Another suggestion: a network of bike and pedestrian trails off streets that channel into lots, where vans could be parked. The vans, equipped with bike racks, could ferry people into town.

But the pollution problem itself provoked one hard-line position: ban metered street parking downtown during pollution-alert days, and impose a surcharge of at least $1 on all parking lots, while bus fares would be kept at $.35--all day.

Another idea proposed turning Broadway, the main north-south street on the east side of the Platte River, into a tree-lined boulevard leading to the civic center and downtown.

The most appealing area for enhancement, many felt, was open space remaining downtown, perfect for a park instead of another 50-story office building.

Another noted that while Paris has the Eiffel Tower, and the Gateway Arch dominates St. Louis, Denver has nothing except the mountains--which aren't actually in Denver--to enhance its character. One suggestion: a giant prism, or prisms, suspended over the mall, to make Denver the City of Rainbows.

Or, try this: ripping up the hot, glaring concrete and asphalt along Market Street, in the city's lower downtown area, and putting back the original Belgian block cobblestones for at least four blocks. Or, replanting natural prairie cluster grasses, sage, buffalo grass, cactus, and other forms of natural vegetation in traffic islands; a Hyde Park-like "speakout center" near city hall, where anyone can stand on a soapbox and rail about any issue; police out of patrol cruisers and into running shoes.

Finally, a most ambitious idea: upgrading the Interstate 70 approach to Denver from the east, so travelers would not be greeted by oil refineries, the metropolitan sewage plant, a junk-strewn river bottom and industrial junkyards.

The *Denver Post* became involved in the Great Ideas, and from time to time published some of them (a number of them were illustrated) on its editorial pages, and eventually in a special section.

The ideas were bundled up and sent to a number of city officials (those responsible for downtown planning), where, it is presumed, they will not gather dust.

The Queen City of the Plains may not be on the move, yet, but it is pointed in the right direction.

23. AMERICAN VALUES

Introduction:

The degree to which a culture or a society is unified and cohesive depends on those values shared by all its members. These shared values form a system of values that gradually becomes taken for granted as generation after generation accept, reinforce, and pass it on to the young. Established values become a part of tradition. Thus, in every society, traditional values are dominant. Except in simple, tribal, isolated groups, however, values do change over time, albeit quite slowly. Thus, in any society today we can expect to see some traditional values as dominant, some other traditional values as declining, and some new values as emerging (even though adhered to by only a minority of citizens).

In the American republic, there are many sources of traditional values: the Puritan/Protestant ethic (derived from the Judeo-Christian tradition), the economic values underlying capitalism, the political values underlying democracy and republicanism, the values inherent in the nation-state, and the philosophical values of Western civilization--Greek, Roman, and later European philosophies. These five broad categories of value sources have slowly evolved over almost four centuries into an American value system.

The American value system today seems to be in some flux, with some traditional values still dominant and accepted by all, others declining in influence, and still other new values emerging as potential replacements for older values. In this lesson, the focus is on dominant, declining, and emerging values in American society.

Objectives: Students will be able to:

1. Recognize a spectrum of American values.

2. Distinguish traditional from emerging values in American society.

3. Identify key contemporary values that tend to bind Americans together in a social whole.

Grade Level: 10-12

Teaching Time: 1 class period

Materials: Copies of Handouts 23-1 and 23-2 for all students

Procedure:

1. Explain to the students that social values are what hold a society together, because all (or almost all) members accept them as valid. Tell students that traditional American values have been derived from at least five general sources: (1) the Judeo-Christian tradition, (2) the principles of democracy, (3) the nature of nationalism, (4) the economic principles of capitalism, and (5) European philosophies (especially those of ancient Greece and Rome). Describe how values change over time, as some dominant values decline and new, emerging values take their places.

2. Distribute Handout 23-1. Go over the handout with the class to make sure students understand the 15 traditional values on the list. Then ask each student to decide which values on the list (or any others one might add on lines 16-18) he/she considers dominant in American society today (using a + for each of these), and which, if any, are declining today (using a - for each of these). Give the students 10-15 minutes to complete the activity. While they are working, place the following matrix on the chalkboard:

Value	Dominant (+)	Declining (-)
1	_____	_____
2	_____	_____
3		
4		
etc.		

3. When the class has completed the activity, ask for a show of hands of all those who considered value 1 as dominant (+); record the tally in the appropriate column of the matrix on the chalkboard. Then ask for hands of those who thought value 1 was declining (-) and record this on the chalkboard. Continue in this manner for values 2-15, and for any students added on lines 16-18.

4. With the matrix completed on the chalkboard, see which 3-5 values have the highest tallies for dominant (+), and which ones are highest for declining (-). Mark those values with the highest totals with a star (*). Next, ask the students who chose these highest rated dominant and declining values to explain or justify their choices. Also, ask any students who added values on lines 16-18 to justify these additions.

5. Distribute Handout 23-2. Make sure all students understand the nature of each of the values on the list. Then ask the students to place a check before any or all (to check none is acceptable) of the values they think are emerging as social values in American society today (they may also add their own value statements on lines 11 and 12). Allow 5-10 minutes for students to complete the activity. While they are working, place the numbers 1-12 on the chalkboard in anticipation of recording tallies for each value.

6. When the students have finished recording their personal choices on the list, ask for a show of hands of those who checked value 1. Record the total on the board. Do the same for values 2-10. Again place stars before the 3-5 values with the highest totals. Ask those who selected the values most frequently mentioned to explain or justify their choices. Then ask those who wrote in values on lines 11 and 12 to justify the addition of those values to the list.

7. As a culminating activity, ask each student to state in his/her own words what it means to be a member or citizen of the United States. Ask the class to consider what are the "ties that bind" Americans to each other as a more or less cohesive society.

Resources:

Elgin, Duane. *Voluntary Simplicity: Toward a Way of Life that Is Outwardly Simple, Inwardly Rich*. New York: William Morrow and Co., 1981.

Ferguson, Marilyn. *The Aquarian Conspiracy: Personal and Social Transformation in the 1980s*. New York: J.P. Tarcher, 1981.

Gallup, George, Jr. *Adventures in Immortality*. New York: McGraw-Hill, 1982.

Mitchell, Arnold. *The Nine American Lifestyles: Who We Are and Where We Are Going*. New York: Macmillan, 1983.

Naisbitt, John. *Megatrends: Ten New Directions Transforming Our Lives*. New York: Warner Books, 1983.

Roszak, Theodore. *Person Planet: The Creative Disintegration of Industrial Society*. New York: Doubleday, 1978.

AMERICAN VALUES

The values listed below might be considered basic, traditional American values (though the list is far from complete). In your experience, which ones seem to be still dominant in your community, state, and nation? Which ones seem to be declining in importance?

A dominant value is one that for generations and/or centuries has traditionally been followed by the vast majority of members of a society. Dominant values are usually taken for granted; that is, people follow them without thinking about it. A declining value, on the other hand, is a traditional value that recently (in the past few decades) has been challenged; fewer and fewer people are adhering to it.

For those values you feel are still dominant, place a + on the blank in front of the value. For those you feel are now declining, place a - on the blank line. If you think a crucial value has been left off the list, write it on line 16. Other values can be added on lines 17 and 18.

_____ 1. Self-denial and the ability to endure distress.

_____ 2. Deferred gratification or the willingness to wait patiently for the rewards of work and action.

_____ 3. Sexual taboos and constraints on sexual practices.

_____ 4. Striving, working hard--hard work yields success.

_____ 5. Punctuality, "time is money," being "on time."

_____ 6. Self-control, reining in emotions, "staying cool."

_____ 7. Volunteering, charity for the good of society.

_____ 8. Profit motive--the desire to profit from work and/or investment.

_____ 9. Acquisitiveness or the desire for material possessions.

_____10. Upward social mobility--the desire to improve one's socioeconomic status.

_____11. Human dignity, worth of the individual, personal rights.

_____12. Consent of the governed and majority rule.

_____13. Equality and equity.

_____14. Patriotic loyalty.

_____15. Territoriality or protection of national sovereignty.

_____16. _____

_____17. _____

_____18. _____

EMERGING AMERICAN VALUES

The following is a list of potential emerging American values. Most of them have been written about in books and magazines in the past 20 years. Which ones do you think are emerging, soon to become dominant, values? Check those you think will become dominant values in the future. If you think some values not listed are also emerging, write them on lines 11 and 12.

_____ 1. Pursuit of immediate pleasures.

_____ 2. Sexual permissiveness and openness.

_____ 3. Acceptance and expression of feelings and emotions.

_____ 4. Limits to growth and search for balanced stability.

_____ 5. More cooperation and less competitiveness.

_____ 6. More concern for quality of life, rather than acquiring material possessions.

_____ 7. More internationalism and less nationalism.

_____ 8. More protection of nature rather than mastery of nature.

_____ 9. Greater political participation (beyond voting).

_____10. Work as self-fulfillment rather than hard and arduous.

_____11. _____

_____12. _____

24. TRANSPORTATION

Introduction:

Humans have employed a variety of forms of transportation during their long history on the planet, beginning with the natural movements of crawling and walking and progressing to the use of other animals (e.g., horses and oxen) for riding or pulling vehicles. Today, we still use these ancient ways of moving about. In the past hundred years or so, however, we have come to rely on fuels and engines to propel our travel machines on and above earth's surface. We in turn have become the machines' "drivers" and "pilots," guiding them on roads and airways from place to place. In just the past few decades, we have been able to orbit the earth and even make a few tracks on the moon.

Several questions must be answered before one can begin to determine the future of transportation in the United States. How much pollution from the use of fossil fuels in cars, trucks, and buses are we willing to tolerate? How long will it be before the supply and price of oil will make it prohibitive to use gas-burning vehicles of any kind? What forms of power are most feasible and desirable in the future? Which types of vehicles are most feasible and desirable in the United States--in the near future and in the next century? These questions are the focus of this lesson.

Objectives: Students will be able to:

1. Speculate on possible and probable modes of public transportation in the year 2000.

2. Speculate on possible and probable modes of private transportation in the year 2000.

Grade Level: 7-12

Teaching Time: 2 class periods

Materials: Copies of Handouts 24-1 and 24-2 for all students

Procedure:

1. Ask the class to estimate the maximum speed for each of the following modes of transportation in miles per hour:

- walking
- running
- a local bus
- your family or personal automobile
- a commercial jet airplane

2. Now pass out Handout 24-1 and have the class compare their estimates and the facts on the handout. Next ask the students if there are other factors besides speed they might consider in getting from one place to another. How might these factors affect the speed of transportation in the future?

3. Give each student a copy of Handout 24-2. Ask them to complete the two checklists ("Private Vehicles" and "Public Transportation"). Remind them that they are to assume they are 30 years old and that they use both private and public transportation. Allow the class about 15-20 minutes to complete the two lists.

4. When all class members have completed the two lists, ask for a show of hands for each item on the "Private Vehicles" list that students checked. Determine the three most popular modes. Do the same for the second list, "Public Transportation." Complete the activity by asking the class if they can brainstorm additional modes for the two lists.

GREAT LEAPS IN HUMAN TRANSPORTATION

Increases in power and speed have made great leaps possible in human transportation. The following chart illustrates this progress.

Mode	Speed
Pedestrian	4 miles per hour (mph)
Horse-Drawn Coach	20 mph
Steam Train	60 mph
Small Airplane (1950)	150 mph
Passenger Jet (1980)	600 mph
Space Vehicle	17,000 mph
Enterprise	?????

FUTURE MODES OF TRANSPORTATION

How will you travel to work, take business trips, or go on vacations in the year 2000? Undoubtedly, you will use a combination of private and public modes of transportation, some that you use today and some that do not yet exist.

For the two types of transportation--public and private--decide which of the modes listed below you might use in the year 2000. Assume you are about 30 years old and that you use both private and public transportation. For each list, check at least one mode you think you might use; mark no more than three modes in each list.

Private Vehicles

_____Automobile (1986 type--$3.00 per gallon of gasoline)

_____Automobile (1999 type; very small; 100 miles per gallon)

_____Automobile (electric; two-seater; top speed 45 mph)

_____Motorcycle (1986 type)

_____Motorcycle (1999 type; electric motor; top speed 45 mph)

_____Motorbike

_____Motor Scooter

_____Bicycle (1986 10-speed)

_____Bicycle (1999 20-speed; easy-pedal; improved gear ratio)

_____Walk (whenever possible)

_____Other (Describe:_____)

Public Transportation

_____Bus (bus-only lanes in town/city and on highways)

_____Train (1986 type)

_____Train (1999 model; top speed 100 mph; intercity)

_____Bullet Train (250 mph; intercity)

_____Airplane (1986 type)

_____Airplane (1999 model; smaller; fuel efficient; slower than in 1980s)

_____Airplane Rocket (partial earth orbit; intercontinental)

_____Underground Mass Driver Tube (500 mph; interregional)

_____People-Mover Car (no driver control except for route, entry, and exit)

_____Moving Sidewalk (horizontal escalator; 5 mph)

_____Other (Describe_____)

25. FUTURE TECHNOLOGIES AND THE WORKPLACE

Introduction:

Computers and other technological innovations are changing the nature of the workplace and the balance between our jobs and our personal lives. Futurists have predicted that up to 45 percent of existing jobs in the United States will be significantly altered by technological changes over the next 20 years, many through a necessary upgrading of skills. Manufacturers are moving rapidly toward highly integrated and flexible production systems employing small computers, sophisticated sensors and servomechanisms, and design and control instruments. Hence, many workers of the future will have to be reassigned to new tasks. Some predict that the increasing need for highly skilled technicians will result in an increase in jobs requiring little skill, leading to sharp decreases in worker motivation.

This lesson presents four future work scenarios for students to analyze. As students consider changes in the future of the workplace, they infer corresponding changes in leisure time and ways in which they can personally prepare for the future.

Objectives: Students will be able to:

1. Speculate about future changes in the workplace.

2. Infer corresponding changes in leisure time.

3. Review four scenarios and analyze cost-benefit implications of each.

4. Brainstorm and construct a class composite of an alternative future for the world of work.

Grade Level: 7-12

Teaching Time: 1-2 class periods

Materials: Copies of Handouts 25-1 and 25-2 for all students

Procedure:

1. Distribute Handout 25-1 and allow five minutes for students to read the scenarios.

2. Divide the class into eight small groups. Tell the groups they will be analyzing the four future work scenarios.

3. Provide students with the cost-benefit analysis worksheets (Handout 25-2). Briefly explain the notion of technology as both a cost to society and as a benefit. Four groups (one per scenario) will analyze potential costs (or negative societal outcomes) and four groups (one per scenario) will analyze potential benefits (or positive outcomes) of the projected scenarios.

4. After about 15 minutes of small-group work, have students share their ideas with the class. Encourage debate of the implications of each scenario concerning:

- Possible futures of leisure.
- Quality of future.
- The value-laden nature of discussions about work and leisure.
- Equity implications--would society become more or less egalitarian?
- The kind of education students will need to prepare them for projected work futures.

5. Have the large group brainstorm and construct a class composite of a desirable alternative future for the world of work and leisure.

Follow-up:

Following discussion of the costs and benefits of the four projected scenarios, encourage students to create brief skits and role-play their interpretations of the scenarios.

Resources:

Asimov, Issac (ed). *Your World 2000 Series*. New York: Facts on File Publications, 1985.

Cornish, Edward (ed). *The Computerized Society: Living and Working in an Electronic Age*. Bethesda, MD: World Future Society, 1985.

Morf, Martin. "Eight Scenarios for Work in the Future." *The Futurist*, Volume 17, Number 3, 1983, pp. 24-30.

Futureprobe Trilogy. 3 Videotapes. Annapolis, MD: SAI Productions.

FUTURE WORK SCENARIOS

The Shorter Workweek: Scenario 1

Based on the efforts of American engineer Frederick Taylor, who timed and analyzed the motions of workers in a Pittsburgh steel plant to learn more about increasing worker productivity, the term *Taylorism* has been used to describe liberation from the workplace by increased machine-tending (requiring little training or effort). In simpler terms, this means that the increased use of machines, computers, and robots has freed workers to spend more and more time doing as they wish. A basic income is assured, and work is evenly distributed as the technological economy generates less and less work. Assuming a case of "extreme Taylorism," the average worker would be liberated from all but two hours each day from the workplace.

A Skilled Elite: Scenario 2

In this scenario, technology becomes so complex that it can only be operated and serviced by highly trained workers. The requirement of union membership for job-holding accompanies qualifications beyond the grasp of many. As fewer and fewer challenging jobs and little intrinsically desirable work remains, the lucky minority of job-holders seeks to keep others from encroaching on their jobs. The privileged job-holders are separated from the underemployed and the unemployed, a distinction going against the grain of American egalitarianism. Society is thus made up of a core elite of professionals and a useless majority unable to manipulate the words and symbols of the information society.

Shadow Work: Scenario 3

Although many predict that the solution to the above dilemma will be to make the majority work by creating "make-work" projects, others predict that the future will bring more "shadow work." This phrase, coined by futurist Ivan Illich, refers to activity that does not contribute to subsistence but is a necessary complement to the production of goods and services in an industrial society. In the future foreseen by Illich, most people work as hard as ever, but not in traditional jobs. They are engaged in shadow work generated by a highly technological environment that gives rise to many artificial personal needs (e.g., doing the shopping, standing in line at the bank, or caring for children). Since these tasks enable or complement the production of goods and services, they are considered legitimate "shadow work."

The Electronic Cottage: Scenario 4

In the electronics cottage future, work is accessible to all. The high economic growth rate generates challenging and profitable work that is distributed fairly. Electronic networking has replaced the need for much informal and shadow work. In this scenario, home workers are engaged in specialized, routinized, and creative tasks. For example, workers are needed to update data banks containing vast amounts of specialized information. Specialists write programs to meet a variety of personal needs; for example, a special program of diagnostic questions and answers assesses medical and psychiatric needs. Futurist Alvin Toffler surmises that the shift from the central workplace to the home could revive the nuclear family and bring about a future of enhanced relationships among people.

COST-BENEFIT ANALYSIS WORKSHEET

Scenario Number _____

Group Number_____

Costs (or negative societal outcomes)	Benefits (or positive societal outcomes)

26. DESIGNING A LEGAL SYSTEM FOR THE FUTURE

Introduction:

Legal systems reflect the social, political, economic, and religious values of a society. As societies have changed over time, the legal systems have adapted to meet new conditions and demands. At a minimum, legal systems provide guidelines for behavior. They also provide a formal structure and process for dealing with problems within the society.

This exercise examines two models for dealing with social deviancy. One model is highly structured and has as its basic premise the removal of deviants from the social fabric. The second model employs an opposite tack. Deviants are enmeshed in and surrounded by ever-larger circles of society until they correct their behavior. With continued population growth and greater world integration, societies will be seeking new ways to adapt their legal systems to those changes.

Objectives: Students will be able to:

1. Explain that a variety of legal systems have developed in response to different social conditions.

2. Interpret abstract representations of social systems.

3. Develop and explain their own abstract model of a legal system of the future.

Grade Level: 10-12

Teaching Time: 3-5 class periods

Materials: Copies of Handouts 26-1 and 26-2 for all students, transparency of annotated graphs for teacher use, optional--blank transparencies with pens, poster paper, crayons

Procedures:

1. Open discussion on legal systems and their function in society. Specific systems and their origins may be mentioned. (Items listed in the resource section provide background you may wish to use in preparing for the discussion.)

2. Divide the class into groups of three to four. Pass out one copy of Handout 26-1 to each group. Allow a few moments for examination. Explain that these graphs represent two very different legal systems. Instruct half of the groups to devise an explanation for the top graph, half for the bottom graph. Students will probably find this analysis to be a difficult task. Encourage them to be inventive. Allow 15 minutes for this activity.

3. Have groups report their explanations to the class. During reporting, allow all opinions to be expressed. Do not evaluate their "correctness."

4. Project the transparency on the screen. Pass out one copy of the graphs for each student. Tell students that you will demonstrate one possible explanation of the graphs. They should note this explanation on their sheets as a guide for the next part of the lesson. Follow the explanation given on the teacher copy, noting the designations of the axes and the incident points for each model. Background on these representations is provided at the end of the lesson.

5. During the next class period, answer any questions remaining from the previous discussion. Pass out Handout 26-2 and read through it with the class. Tell students they will be working in their groups from the previous day. They should spend about 10 minutes on the first two steps, then go on

to the rest of the assignment, for which they will have about 1 1/2 class periods. Circulate among the groups to provide help.

6. During the third class period devoted to this lesson, groups should complete their system designs and decide on the graphic representations. The graph may be drawn onto transparencies or on poster paper. They should reserve the last 15 minutes of this class period for planning their oral presentations. (In large classes the oral reports may be started now.)

7. Allow 5-10 minutes for each group's report. Collect each group's package when it has completed its report.

8. Conduct a class discussion of the varying aspects of society each group chose to emphasize in their legal system.

Follow-up:

Provide time for students to examine the graphs of the other groups in detail. Ask them to write a contrast-comparison paper using the graphs for data.

Resources:

Adelfang, Karen, Kathie Joyner, Susan McLaughlin, Gayle Mertz, and Beverly Plank. *Law Around the World*. Boulder, CO: Safeguard Law Related Education Program, 1985.

Li, Victor H. *Law Without Lawyers: A Comparative View of Law in the United States and China*. Boulder, CO: Westview Press, 1978.

Merryman, John Henry. *The Civil Law Tradition: An Introduction to the Legal Systems of Western Europe and Latin America*. (2nd ed.) Stanford, CA: Stanford University Press, 1984.

Background Notes on the Graphic Representations

1. These graphic representations of legal systems are based on an idea in Victor Li's book, *Law Without Lawyers*. The two systems illustrated are the American/adversarial system (Figure 1) and the Chinese/inquisitorial (Figure 2) system. These national identifications are not relevant to the exercise at hand so a more detailed discussion of the many complexities inherent in such a comparison is not included here. (Refer to Li for more information.) This discussion also does not go into great detail over the differences between commercial, criminal, and civil law. *Law* throughout this exercise refers to social norms, formal and informal, that attempt to regulate individual behavior.

2. In explaining Figure 1, note that the vertical axis is the degree of social pressure over time on any person in a society. An arbitrary point was selected to indicate a "normal" level of impact on an individual's life. The horizontal axis records an increasing degree of social deviancy over time. *Deviancy* means any action that violates the accepted norms of propriety or formal law in the society. This can mean criminal activity. Criminal activity is the topic focused on in the scenario given to students and is the easiest to deal with.

The incident labels indicate specific deviant actions (e.g., the theft of a scarf from a store). The second incident is of greater consequence, both in specific nature and because it is a second offense.

The point of removal from society is the point where the deviant has acted in such an antisocial manner that the formal legal system takes over completely. In Figure 1, the dotted lines indicate that the formal system has had an impact, but the deviant has been returned to society under some degree of parole. The second offense, however, sends the person completely out of the mainstream of

society--prison or execution, thus ending informal social pressure, formal social pressure, deviancy, and life.

3. In explaining Figure 2, note that the axes show the same variables as those in Figure 1. The difference is in the way this society deals with deviance. Rather than moving violators quickly from the informal social system to the formal legal system, as in Figure 1, this society relies heavily on informal systems. Incidents of deviancy result in an increase in pressure from the social actors surrounding the deviant (e.g., the family, the neighborhood, the school, the workplace, the town) in a hierarchy of pressure. The point of removal from society is reached only after extreme pressure methods outside of the formal legal system have failed to change the deviant. Dramatic crimes such as treason or murder will naturally move the deviant immediately into the formal legal system.

Because this society spends so much time and effort trying to reform the deviant, punishment at the point of removal can be extreme--long prison sentences or rapid execution.

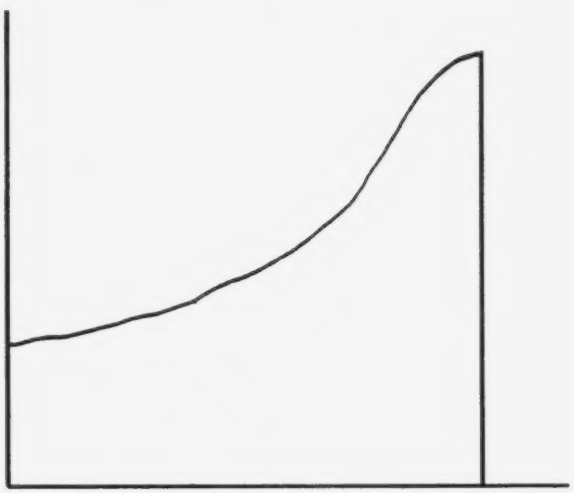
4. One way to illustrate the differences between the two systems is to personalize the models. Use the example of a teenager out for an afternoon of shoplifting. Describe the way such a person would be dealt with in each system.

5. Probe to have students examine the benefits and difficulties of each system. Students should also try to describe some characteristics of societies that might lead to a preference for one system over the other. Some topics to be explored might include demography--total population, age distribution, physical distribution, health, sex distribution, political system, geography, wealth distribution, education, religion.

GRAPHIC REPRESENTATIONS OF TWO LEGAL SYSTEMS

Figure 1

Figure 2



GRAPHIC REPRESENTATIONS OF TWO LEGAL SYSTEMS

ANNOTATED FOR TEACHER

Figure 1

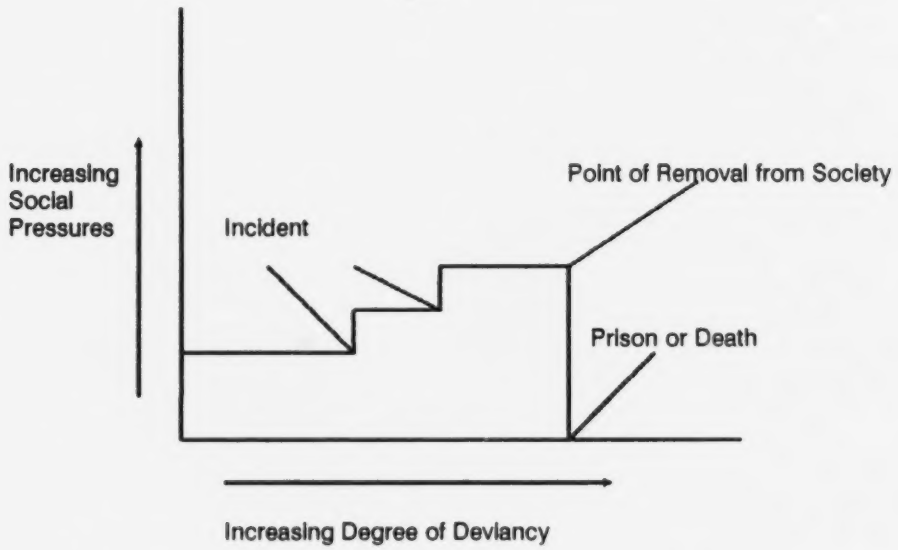
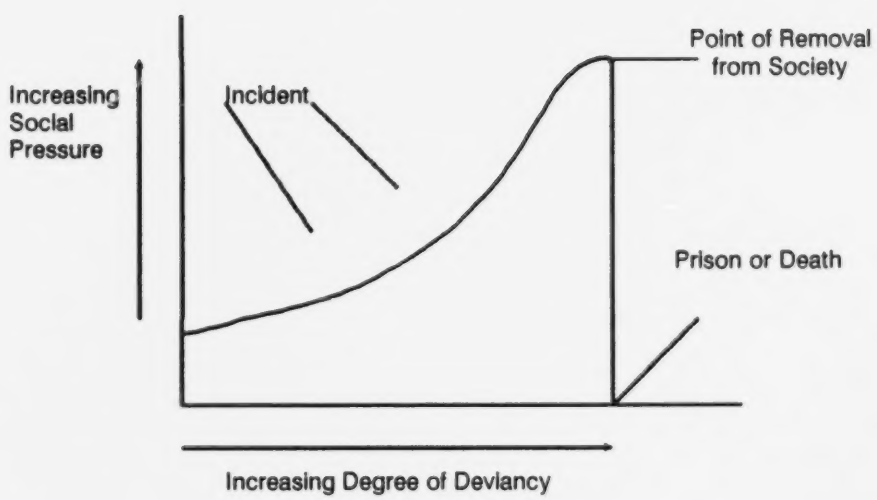


Figure 2



LEGAL SYSTEMS OF THE FUTURE

As the population of the world has grown ever nearer 10 billion, it has become increasingly difficult to govern. Crowding in the megavilles has resulted in unprecedented crime rates. Traditional methods of social control are failing. Court systems have a five-year backlog of cases. *Crime* has begun to lose its meaning, as people feel pressured to resort to unusual acts of self-preservation.

As members of the Special Commission to the Supreme Legal Council, it is your responsibility to design a new legal system. The only specific limitation you have is that the new system you devise must be humane. Any system that does not uphold the dignity of humanity will stand no chance of approval. Follow the directions below.

1. Within your group, discuss the elements of society that you think have the most influence on the development of the form and procedures of a legal system. Have one person act as recorder and make a list of at least 15 different characteristics of society.
2. From your list of critical characteristics, select the five that you think are most important in the development of a legal system. Write these five characteristics on a separate sheet so that everyone can see them. This sheet will be turned in with your final package.
3. Using your list of five critical characteristics, devise a legal system for the society of the future.
4. Draw a graph to represent your system.
5. Each member of the group will write a one- to two-page explanation of your system. These explanations will be turned in with the group package.
6. Prepare an oral presentation for the class. Your presentation should explain your system and illustrate it with the graph you have drawn.
7. On the final day of the exercise, pay close attention to the systems devised by the other groups. Be prepared to ask questions about their legal systems and the graphs they have designed. Also be prepared to answer questions about your own system!

Summary

Each group will be responsible for the following items at the end of the project:

- List of five critical characteristics.
- A set of one- or two-page descriptions of your group's system (one description from each member of the group).
- A graph that represents your system.

An oral presentation to the class on the legal system you have devised.

27. EDUCATION 2010

Introduction:

One way futurists portray their forecasts is through scenarios, narrative descriptions of future events and their contexts at some point in the future. Among the reasons this is such a popular technique are because many individual forecasts can be combined to show their interactions and because the narrative story line is more interesting for the reader.

This lesson presents a scenario of what public education in the United States might be like about 25 years from now. The challenge for students is to determine how the author arrived at this depiction and what trends and events were used in the scenario.

Objectives: Students will be able to:

1. Assess the degree of plausibility of a future scenario.

2. Determine the assumptions underlying particular trends and events in a scenario.

3. Determine if a particular scenario is a desirable future.

4. Fill in the outline of a scenario depicting the student 14 years from now.

Grade Level: 10-12

Teaching Time: 2 class periods

Materials: Copies of Handouts 27-1 and 27-2 for all students

Procedure:

1. First explain to the class what a future scenario is. Pass out a copy of Handout 27-1. Ask the students to read the scenario, giving them about 15 minutes to complete the reading. When the class has finished the reading, ask any or all of the following questions based on the scenario:

- How probable or improbable is the educational scenario? Which aspects are more probable? Which less probable?
- According to the scenario, in 2010 what educational uses might there be for school buildings like the one you are in today?
- If preschool and public school educations in 2010 cost about $10,000 per year, and college/university education (not including room and board) costs about $20,000 per year, how much of the $500,000 educational credit card might be used by a person to obtain a bachelor's degree? How might the balance be spent in the remainder of this person's lifetime?
- Given a telephone, a computer (with modem), and a television set in every home, how much of the curriculum in our school today could be "transported" to your home? How do you think you would like "education in the home"? If you were allowed to proceed at your own pace, regardless of age and grade-level, how long would it take you (in years and months) to complete all 13 grades (i.e., kindergarten-grade 12) and earn a high school diploma?
- Would you like the new curriculum described in this scenario? Why or why not? What would you add to or subtract from this curriculum?
- If you and your fellow students could change anything you want about the school you now attend, what changes would you make?

2. Distribute Handout 27-2. Give the class about 30 minutes to "fill in" the outline of a personal scenario for the year 2000. When they have completed the outline/scenario, ask for volunteers to read their scenarios to the class. Ask those listening to decide if the scenario is: (1) probable or improbable, and why or why not, and (2) dependent on key changes or inventions happening between 1986 and 2000, and which ones.

Resources:

Botkin, James W., et al. *No Limits to Learning: Bridging the Human Gap: The Club of Rome Report*. New York: Pergamon Press, 1979.

Ferguson, Marilyn. *The Aquarian Conspiracy: Personal and Social Transformation in the 1980s*. New York: J.P. Tarcher, 1981.

Kierstead, Fred, and Jim Bowman (eds.). *Educational Futures*. Washington, DC: World Future Society, 1979.

Naisbitt, John. *Megatrends: Ten New Directions Transforming Our Lives*. New York: Warner Books, 1983.

Shane, Harold G., and M. Bernadine Tabler. *Educating for a New Millenium*. Bloomington, IN: Phi Delta Kappa, 1981.

EDUCATION 2010

In the past quarter century, a number of developments in American society in general and a few changes in public education in particular have had an impact on American education. Specifically, four major societal trends already evident in the 1980s had, by the turn of the century, become dominant modes with major implications for public education.

First, the growing trend toward smaller families stabilized the U.S. population at about 300 million. Today in 2010 a minus-ZPG condition exists. For a decade, the student enrollment in the schools has remained constant, but is now showing a slight decline in the primary grades.

Second, 80 percent of the married couples in the United States between the ages of 19 and 39 find it economically necessary or personally preferable for both partners to work. For those couples with young children, this presents a problem of child-care. Over the past 25 years, numerous private and public day-care centers, preschools, and specialized prevocational schools have come into existence to serve this burgeoning child population. Some of these services are free; some are cooperative, requiring parent participation; and others charge fees ranging from moderate to expensive.

Third, due to dwindling supplies and escalating costs of oil, gas-powered forms of transportation have become too expensive for all but the rich. Thus, less time is spent in commuting or travel, and workers and families now spend more time at home and in the immediate neighborhood. Travel that does occur is by foot or bicycle, by moving sidewalks or small people-mover electric cars on elevated fixed-route ramps, and by electric (photovoltaic batteries for power) buses, subways, and trains. Travel over longer distances, connecting major domestic cities, is by underground speed tubes powered by mass drivers, while international travel is by partly-orbital rockets. These developments have made it necessary to limit home-to-school-to-home travel by students, which has in turn led to greater school reliance on electronic communications media.

Fourth, the Communications Revolution pushed America into a Post-Industrial Society. Thus, by the turn of the century, what manufacturing and industrial production remained inside the nation's borders was almost totally automated. All other businesses had fully incorporated the increased productivity potential of computers. Many places of business, plants, warehouses, government offices, homes, and educational institutions have their own computers controlling an array of other electronic media. These electronic systems are called Communications Centers. They are interconnected by cable or telephone line in vast national and international networks. This worldwide grid makes it possible to connect anyone to anyone else, anywhere, at almost any time.

In addition to these four societal trends, public education in the United States has also undergone some significant changes in the past 25 years. Since it became obvious that all agencies in a modern society "educate" in some manner and that the Communications Revolution made it possible to deliver educational services anywhere, at any time, the requirement that the young "go to school" became absurd and anachronistic. Thus, by the late 1990s, every state had abolished its compulsory attendance law, enacting in its place a statute requiring the mastery of a general curriculum by all youth sometime between the ages of 12 and 18.

This change left the nation with more than a million classrooms designed for the now-obsolete mode of group instruction. Many schools were sold or rented, but most were redesigned and renovated to accommodate new modes of creating curriculum and providing instruction--most in the electronic media mode and mostly off-campus. For certain special types of group-based learning, central gathering places were still needed. These included drama/theater productions; recreational and competitive team sports; band, orchestral, and choral music performances; some rare vocational pursuits (though almost all are now conducted in the field via apprenticeships and internships paid for by the student); and a variety of small-group activities designed to hone interpersonal/human relations skills.

Recognizing the social, economic, political, and humanistic values of education, the U.S. Congress enacted in the year 2000 the farsighted Universal Educational Opportunity Act. This act provided each newborn citizen with a lifetime educational voucher or credit card worth $500,000--in 1990 U.S. dollars. This stroke of wisdom promised that a learning society would become a reality in the 21st century. The UEO Act also provided that one could purchase learning materials, media, and experiences from a variety of sources in both the public and private domains.

In reaction to the pressing needs for child-care, babysitting, and away-from-home supervision of adolescents, the public schools converted some existing facilities and built some new ones to provide these services free or at a low fee. These new centers offered supervised play, recreation, and some individual computer-controlled instruction.

Gradually, new modes of learning emerged. The new norm for kindergarten-grade 12 public education is now entry at age four and exit at age 13 or 14, although this pattern appeals to only about 40 percent of all families with school-age children. The remaining 60 percent are divided in their preferences among a spectrum of "schools of choice": Roman Catholic and Protestant Day Schools (both types partly supported by state funds), Proprietary Specialized Technical Schools (privately owned, profit-making, and vocationally oriented), Private and Public Automated Learning Centers (individualized learning for those requiring minimal help and supervision; located in neighborhoods, office complexes, and shopping malls), Special Purpose Private and Public Academies (for such broad specialties as the performing arts, engineering, computer science, and athletics; and including such non-traditional learning experiences as learning-on-tour, worldwide travel learning, global education, and futures education), and many other school systems such as Buddhist Schools of America, Waldorf Schools (originally founded by Rudolph Steiner in Europe), and Academic Excellence Schools, Inc.

The curriculum has also changed. Changing perceptions of the traditional subject areas was difficult at first, due to their prevalence in schools, libraries, universities, and in the minds of older generations. But leaders in business, industry, and government (and some in education) argued forcefully that what a citizen of the future needed was unified learning rather than knowledge in discrete bundles called subjects. This reaffirmed what some farsighted educators in the early decades of the 20th century had proposed under such names as "correlated curriculum," "integrated studies," "multidisciplinary learning," and "interdisciplinary fields."

The areas of the new general education curriculum (i.e., not specialized or vocational education) were given different names and titles, depending on the nature of the various schools. The following list is representative of the scope of learning that emerged by 2010:

- analysis and synthesis
- career planning
- communications (including foreign languages)
- computer literacy
- creativity
- critical thinking
- decision-making
- evaluation
- problem-solving
- orientations in time and space
- scientific method

Some of the above categories, when further subdivided, yield such specific skills as the following:

- identifying a problem
- interpreting a personality inventory
- brainstorming possible solutions
- separating fact from opinion
- adapting to ambiguity and uncertainty
- accomplishing a work assignment in limited time
- writing a memo
- briefing an employer on a work task
- interpreting tables and graphs

One might wonder what happened to the huge, impersonal, bureaucratic, urban and suburban schools and school districts of the 1980s? It appears that four concepts barely visible in 1980 became prominent in the 1990s and doomed the old education colossus. These were: Communication, Decentralization, Diversity, and "Small Is Beautiful." Complex systems of electronic communication media eliminated the need to assemble people in central places. They also made it feasible to decentralize all large societal institutions that previously had been largely responsible for alienation and impersonality. The pluralistic nature of American society finally became accepted and valued, leading to demands for diversity in the provision and delivery of all goods and services. Finally, the previous three ideas made it possible for people to work and live in the intimacy and support of small groups, where individuality and cohesiveness could flourish side by side. In the new learning society, education prospered because it responded to the multitude of learning needs and styles, in a rainbow profusion of varied landscapes.

MY PERSONAL FUTURE SCENARIO

It is now the year 2000, and I am _____ years old. Presently, I am living in_____, which is located in the nation of _____. The work I do here is best described as _____. I have lived in this location for the past _____ years.

Life today is both similar to and different from living in the year 1986. It is similar in that these characteristics have stayed the same: (1) _____, (2) _____, (3) _____, (4) _____, and (5)_____. At the same time, there are also many differences in living, such as: (1) _____, (2) _____, (3) _____, (4) _____, and (5)_____.

What I most like about life today (in 2000) is that _____ _____; but I also miss (from the 1980s) _____.

Between work, leisure, sleep/eat, and family/friends, I generally divide my time over a typical week (i.e., 1209 hours) in this way:

1. work = _____ hours
2. leisure = _____ hours
3. sleep/eat = _____ hours
4. family/friends = _____ hours

28. SOLVING THE PROBLEMS OF THIRD WORLD NATIONS

Introduction:

This lesson provides a sample scenario and data for students to use in applying the Problem-Solving Format introduced in Lesson 11 in the "Tools of Futurists" section of this book. The scenario is presented in the form of a brief definition of the term Third World and a series of maps. The maps provide some direction for the identification of Third World problems and also provide a base for further research into such specific problems as diseases in the Third World. Background information about the maps is provided at the end of the lesson.

Objective: Students will be able to:

1. List some of the physical problems faced by Third World peoples.

2. Use brainstorming techniques to analyze a situation.

3. Apply a problem-solving method to a specific set of circumstances.

Grade Level: 7-12

Teaching Time: 4-5 class periods

Materials: Copies of Handouts 28-1 and 28-2 for all students

Procedure:

1. Divide the class into groups of four to six. Pass out Handout 28-1. Allow 10-15 minutes for students to read the material. Then distribute Handout 28-2. If your class has already done Lesson 11, you will simply need to review the problem-solving process with students. If you did not use Lesson 11, go over the handout step by step, explaining the process to students. Have students write the due dates for completion of each step on the handout.

2. Provide the balance of the first class period for groups to discuss the scenario and plan their research.

3. Allow one class period for groups to gather background information on the scenario. Provide some guidance to probable sources of information and location of items in the library. For younger classes, a bibliography of specific items to be read might be provided. Reconvene shortly before the end of the period to answer general questions and to outline the next day's plan. (Class time may be reduced by assigning all research activities as homework, although using class time will allow the instructor to help students with specific problems.)

4. Discuss brainstorming techniques, as listed on Handout 28-2. You might also suggest that students use the SCAMPER technique to improve the quality of their brainstorming. SCAMPER is an acronym that means:

Substitute, Subtract
Combine
Adapt, Add
Modify, Minify, Magnify
Put to other uses, Piggyback
Eliminate
Reverse, Rearrange

5. Have students reform their groups. To insure that each group has completed steps 1-3 by the end of the period, allow 15 minutes for step 1, 5 minutes for step 2, and 15 minutes for step 3.

6. At the beginning of the next class period, tell students that steps 4-6 will be completed that day. In completing steps 4-6, the evaluation grid is filled in to determine the best solution. Each group then writes a more elaborate explanation of their solution, including who will do the recommended action; what will be done; where it will be done; when it will happen; how it will be done; how it will be financed; how it will remedy the problem situation. Finally, each group will prepare a five-minute presentation to be given the next day. The presentation should attempt to sell the group's solution to the class.

7. Have groups make their presentations. When all the presentations have been made, encourage the class to discuss the merits of each.

Resources:

Falk, Richard A., et al. *Toward A Just World Order*. Boulder, CO: Westview Press, 1982.

Fuller, R. Buckminster. *Operating Manual for Spaceship Earth*. New York: Dutton, 1977.

Harrison, Paul. *Inside the Third World*. Middlesex, U.K.: Penguin Books, Ltd., 1982.

Ward, Barbara. *Progress for a Small Planet*. New York: W.W. Norton, 1979.

World Almanac and Book of Facts: 1986. New York: Newspaper Enterprise Association, 1986.

Background Notes on World Maps

1. These world maps employ an Eckert projection. This projection has elliptical meridians, with parallels spaced to give equal area projections. This version is based on a map by the World Bank.

2. The series of maps included is adapted from *Inside the Third World*, by Paul Harrison (Middlesex, U.K.: Penguin Books, Ltd., 1982), pp. 480-491. The data for the Temperature and Income map was recalculated using data from the *World Almanac and Book of Facts: 1986* (New York: Newspaper Enterprise Association, 1985).

THE THIRD WORLD--AN INTERNATIONAL DILEMMA

"The process of development, the fate of people going through it, is a global drama. It is the story, often tragic, of billions of individual lives, their hopes and frustrations, their efforts and their failures, their sufferings and their conflicts. It is perhaps the central story of our time. One that concerns, directly, three-quarters of humanity, and ought to concern the other, industrialized quarter much more than it does, if only because its inhabitants live in relative comfort on a planet in which there is so much staggering poverty.

From Paul Harrison, *Inside the Third World* (Middlesex, U.K.: Penguin Books, Ltd., 1982), p. 17.

The year is 2025. The First and Second Worlds have developed into progressive and secure socioeconomic systems. The Third World has fallen farther and farther behind. Debate on the status and the future of Third World peoples usually centers on abstract issues of political alignment, international debt, and burgeoning population. Problems more basic to daily survival have frequently been overlooked. Most people, most nations, are sincerely interested in preserving their lives. Most people and nations are sincerely interested in improving the quality of their lives.

What forces have hindered development in the Third World? Theorists have suggested that cultural traits and physical settings combine to influence the direction and degree of development. Cultural traits vary greatly across the scope of the Third World, making it difficult to identify commonalities. The shared physical characteristics are more easily categorized.

The maps on the following pages illustrate some conditions in Third World nations that are a consequence of their location on the surface of the Earth. The angle of the sun's rays, plate tectonics, weather patterns, and the number of biological pests are all related to the equatorial clustering of the Third World countries.

Use the Problem-Solving Steps to identify problems and solutions that center on these physical realities. Search for problems and solutions that go beyond the obvious ones indicated by the maps. Remember, this is the 21st century.

What can be done?

Figure 1

Temperature and Income

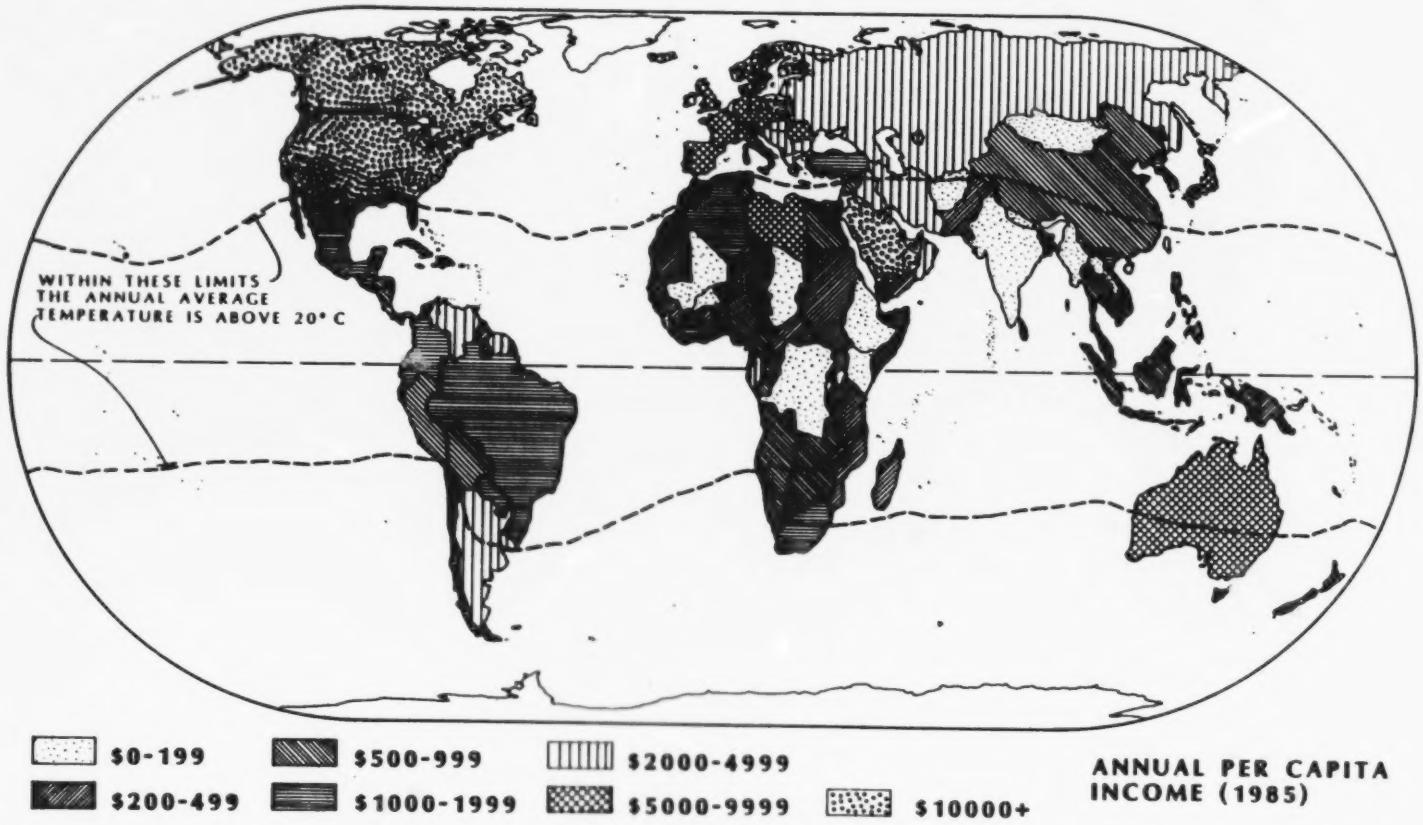


Figure 2

Earthquakes and Volcanoes

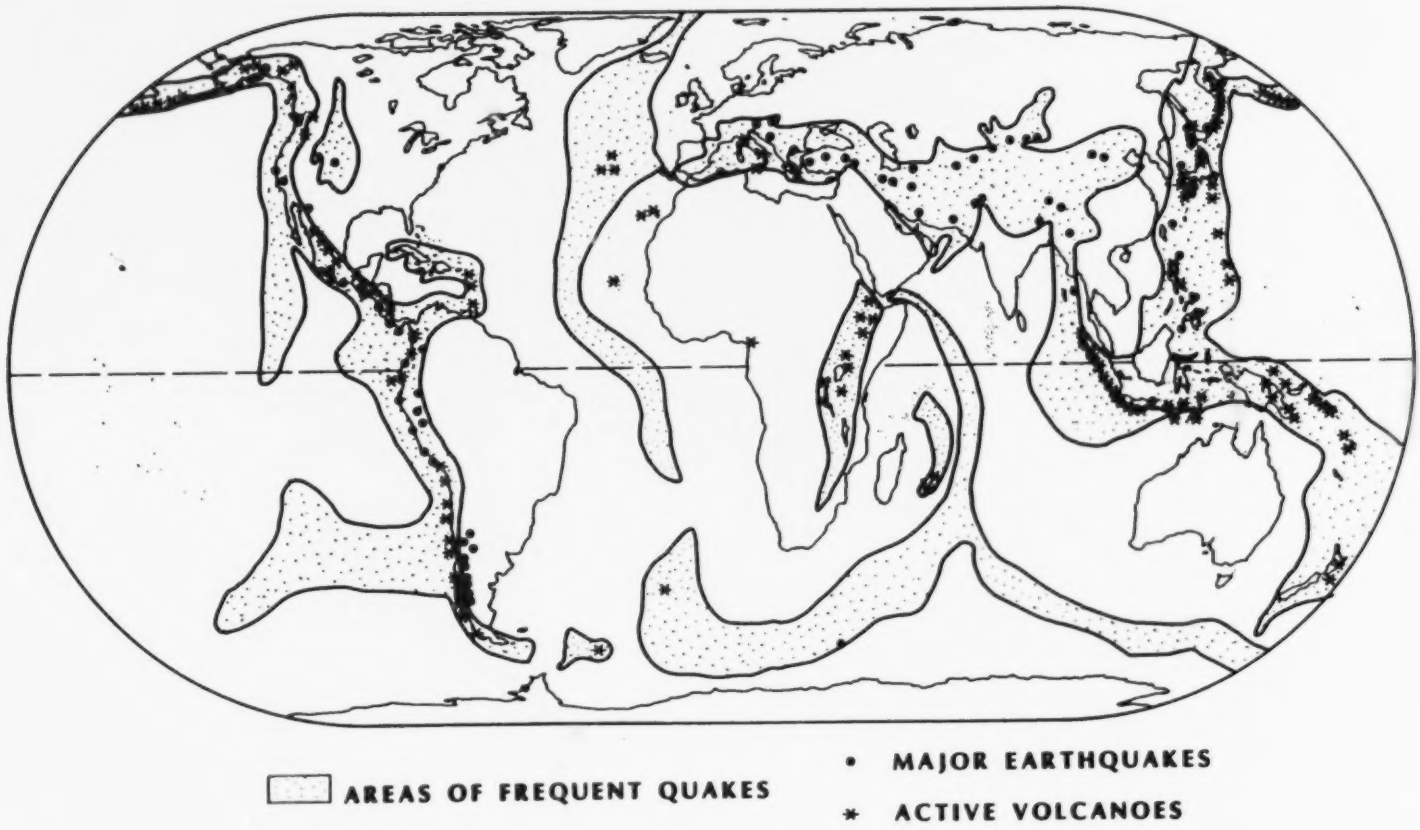


Figure 3

Climate

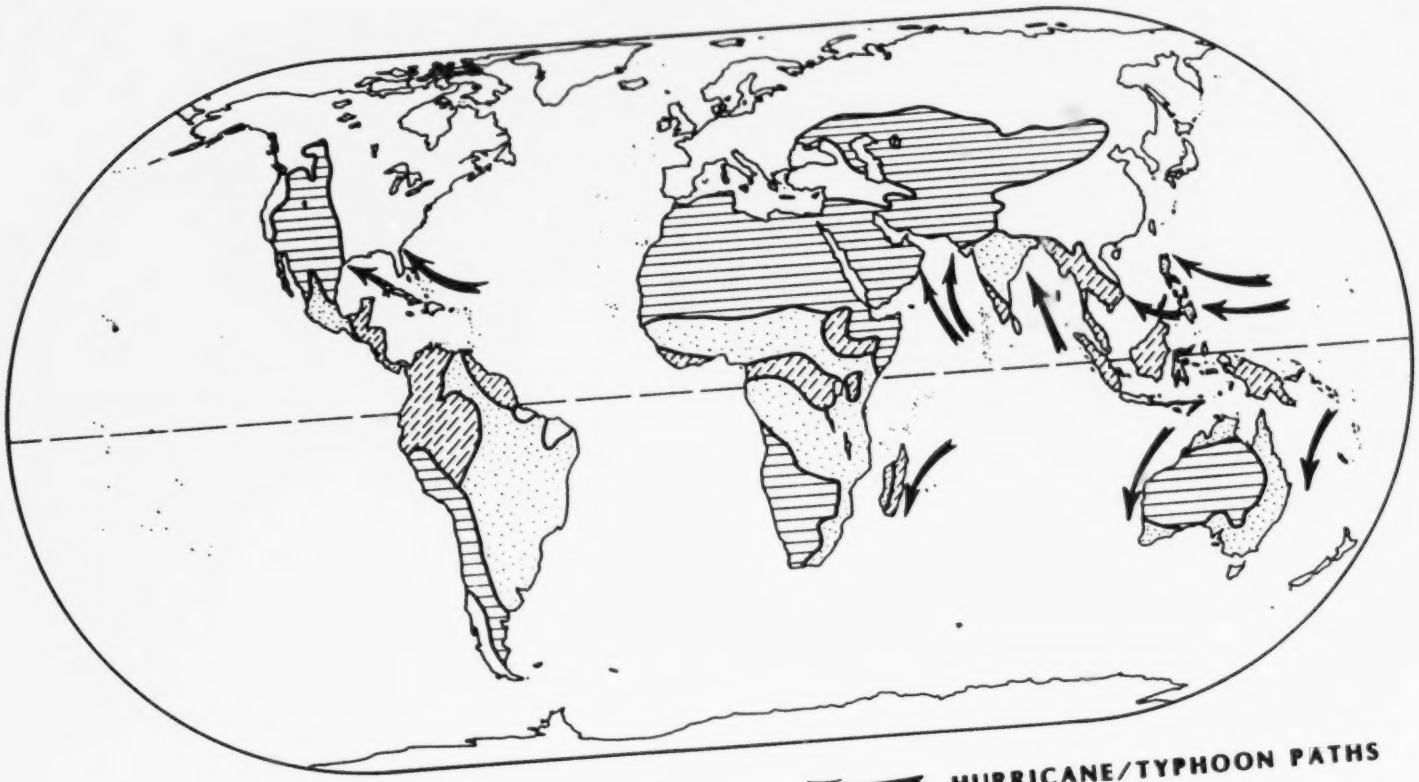
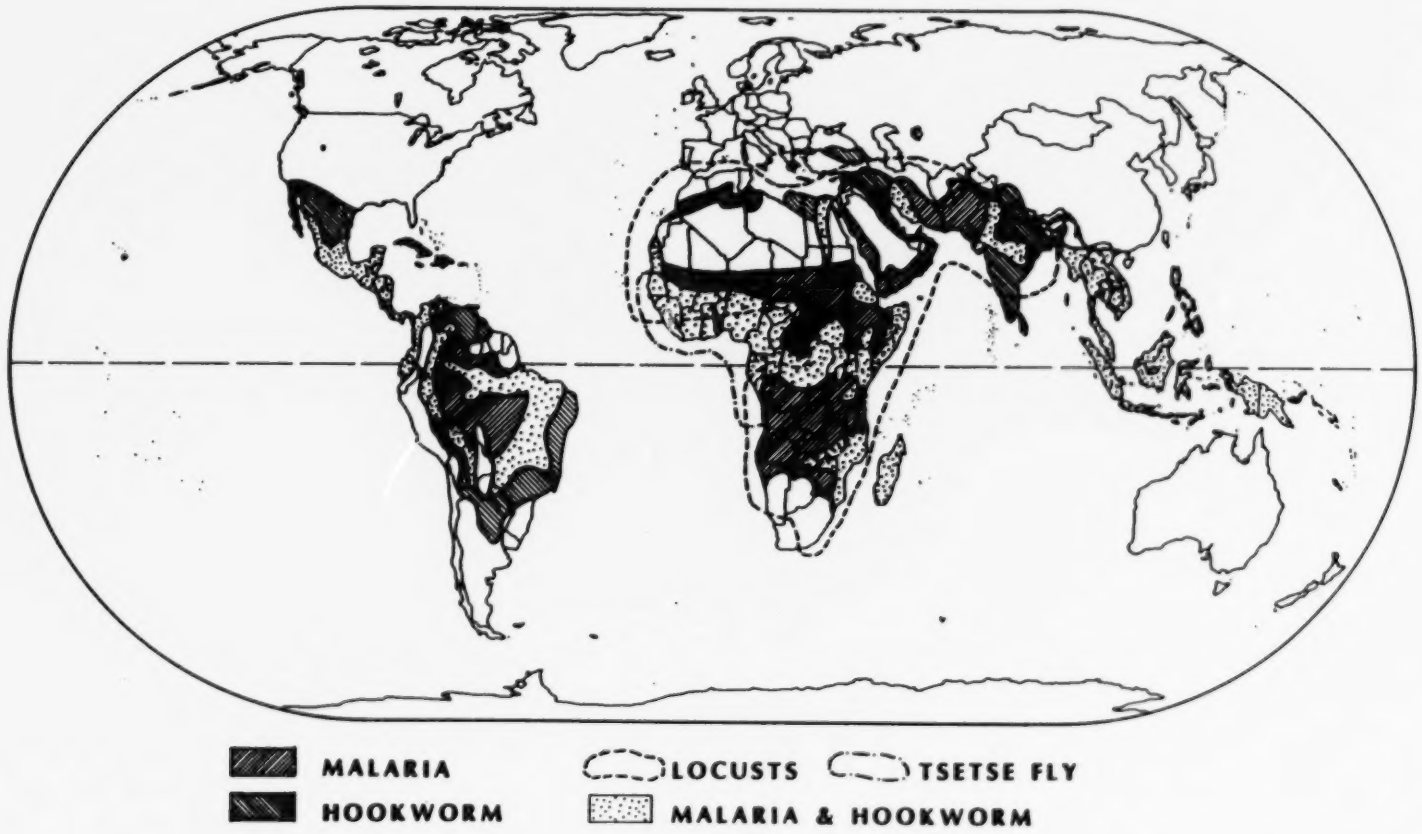


Figure 4

Pests and Diseases



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PROBLEM-SOLVING STEPS

Step 1: Research and Problem Identification

Read the scenario carefully. Gather information about the general situation described in the scenario. In your group, brainstorm 10-15 problems that you think might arise from the scenario. Pick a recorder to write down the ideas. Use the rules of brainstorming!

> Rules for Brainstorming
>
> 1. Say anything that comes to mind.
> 2. Piggybacking on the ideas of others is good.
> 3. Don't evaluate or criticize what others say.
> 4. When you can't think of anything else, wait a minute and try again.

Due date: _____

Step 2: Central Problem Identification

Review your list of problems. Imagine you can solve only one of them. Which problem would have the greatest impact on the overall situation? Your group will focus on that problem. Write out exactly what the problem is. Include these factors: Who, or what, is the problem? Where is the problem occurring? When is the problem occurring? Why is it a problem?

Due date: _____

Step 3: Solutions

Brainstorm 15-20 solutions to the central problem you identified in Step 2. Think of as many types of solutions as possible--economic, political, mechanical, philosophical . . . .

Due date: _____

Step 4: Evaluation of Solutions

To measure the quality of your solutions, you must develop some means of determining exactly what makes up a good solution. These measurements of quality, or criteria, will enable you to select the solution that best addresses the central problem.

Choose FIVE criteria carefully so that you are really measuring an aspect of the solution that is relevant to the problem. For example, if you were buying a car, your criteria might be:

Which car:
1. Is least expensive?
2. Is a two-door?
3. Is my favorite color?

You could take this list to each car dealer and check each criterion against each model. The car that had the most positive checks would be the best car for you to buy.

Write your criteria here:

1.

2.

3.

4.

5.

Write ten of your best solutions in the evaluation grid below. Across the top of the grid, write in the criteria.

Evaluation Grid

SOLUTIONS	CRITERIA #1	#2	#3	#4	#5	TOTALS
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						

Beginning with the first criterion, decide which solution fits that criteria best--give it a rating of 10. Give the worst solution a rating of 1. Rate the rest of the solutions somewhere within this range. Do not duplicate your ratings; that is, within a criteria column, only one solution can have a rating of 3, etc. Go on to the next criterion. After you have evaluated all solutions for all criteria, total the rows to the right. The solution with the highest total is the best solution according to your criteria.

Due date: _____

Step 5: Describing the Best Solution

Each team member should write a three-paragraph elaboration of your best solution. Include an explanation of who will do the action; what will be done; where it will be done; when it will happen; how it will be done; how it will be financed; how this solution will remedy the problem.

Due date: _____

Step 6: Solution Presentation

Assume that your group has been called before the United Nations (or some other appropriate body) because of newspaper reports that you have developed a wonderful solution to a very serious problem. Your task is to make a five-minute presentation to the class (the United Nations) that will demonstrate the superiority of your plan.

Include in your presentation:

1. A statement of the problem you are solving.

2. A statement of the solution you are proposing.

3. Charts, photos, drawings, and/or dramatizations to convince them that you have the best answer.

Due date: _____

29. KNOWLEDGE, SKILLS, AND ATTITUDES FOR THE YEAR 2000

Introduction:

In a rapidly changing and increasingly interdependent world, educators are being forced to make critical and difficult decisions as to what should be taught to prepare students for the world of today and the world of tomorrow. The purpose of this lesson is to seek students' opinions as to what knowledge, skills, and attitudes need to be taught in today's schools.

This activity is particularly valuable for teachers who want to know what students think is important. Too often, decisions about curriculum are made without student input, and all involved necessarily suffer. Teachers who choose to complete this activity should also be prepared to initiate change, if change can lead to a more productive and constructive classroom.

Objectives: Students will be able to:

1. List important educational goals (knowledge, skills, attitudes).

2. Evaluate the educational program or system responsible for delivering his/her education.

3. Determine personal areas of interest, strength, weakness, and responsibility.

Grade Level: 7-12

Teaching Time: 2 class periods

Materials: Copies of Handout 29-1 for all students, poster paper, markers, tape

Procedure:

1. Distribute Handout 29-1. Ask students to complete the survey by reading each statement and noting their responses in the columns on the right side of the page.

2. When students have completed the survey, select four to six of the survey items and ask for a show of hands for the two responses. For those items where disagreements occur, ask students for their reasons for choosing one response or the other, thereby generating discussion on the item.

3. Following discussion of a few of the items, ask students to write down how old they will be in the year 2000. Ask students what they feel they will have to know, be able to do, and believe in order to successfully live in the year 2000.

4. Divide students into groups of four or five. Assign each group one of the major topics: knowledge, skills, or attitudes. Ask each group to brainstorm a list of items that they feel they will have to know, do, or believe in order to live successfully in the year 2000. Ask one student in each group to list the responses on a piece of poster paper.

5. Following the brainstorms, ask each group to post its responses and to read them to the rest of the group. Allow for clarification questions; seek additions to each of the three lists.

6. With the assistance of the students, categorize the lists into knowledge items, skill items, and attitude/value items. Ask students to make a copy of the lists for themselves. Once students have the categorized list, ask them to evaluate the list in two ways:

   - Ask students to review each item and mark it S (strong) or W (weak) to indicate their own level of competency.

- Ask students to review each item and assign a Y (yes) or N (no) to indicate whether the item is part of the present teaching/learning process as they know it.

7. Discuss the results with the class. Be prepared to offer suggestions for solving individual student and/or program problems.

Resources:

Barney, Gerald O. *The Global 2000 Report to the President*. New York: Penguin Books, 1980.

Fuller, R. Buckminster. *Critical Path*. New York: St. Martin's Press, 1981.

O'Neill. Gerard K. *2081: A Hopeful View of Human Future*. New York: Simon and Schuster, 1982.

Salk, Jonas, and Jonathon Salk. *World Population and Human Values: A New Reality*. New York: Harper and Row, 1981.

FORECASTS FOR THE YEAR 2000

Each statement below describes a possible condition in the year 2000. For each statement, mark the right column indicating whether you think it will or will not happen.

	Will Happen	Will not Happen
1. The present world population of 4.7 billion will have increased by at least 50 percent; world population will be more than 6 billion.	_____	_____
2. The present U.S. population of 230 million will have increased much more slowly than the population of the world; U.S. population will not be more than 260 million.	_____	_____
3. Population will have grown faster than the ability to produce food; in some parts of the world, millions will be dying of hunger.	_____	_____
4. American per capita income will have doubled from $10,500 in 1981 to $21,000 (in 1981 dollars).	_____	_____
5. Per capita income in the developing nations will have doubled, from $300 to $600.	_____	_____
6. Many of the countries that were still "developing" in the 1980s will have industrialized.	_____	_____
7. Air and water pollution levels throughout the world will be high because nations industrializing and modernizing agriculture could not afford pollution controls.	_____	_____
8. Global reserves of many important nonrenewable natural resources such as petroleum, natural gas, aluminum, copper, lead, and tin will be almost exhausted.	_____	_____
9. Nuclear power will be supplying at least one-half of U.S. energy requirements and will be expanding.	_____	_____
10. Several serious accidents involving radioactive contamination of the surrounding areas will have occurred at nuclear power stations.	_____	_____
11. Almost all nations will possess nuclear weapons.	_____	_____

30. POPULATION MOVEMENTS

Introduction:

The United States is well known for its highly mobile population. By 1980 most people lived in the same house for no more than three years, on the average. In this exercise nine trends in population movement are presented. A series of options for classroom use of that information is then presented.

Objectives: Students will be able to:

1. Recognize the role of population dynamics in the United States.

2. Attempt to predict future population movements.

Grade Level: 7-12

Teaching Time: 1-2 class periods

Materials: Copies of Handout 30-1 for all students, current newspapers and magazines

Procedure:

1. Distribute Handout 30-1 and briefly discuss each of the nine population movements listed. Historical background for most of them can be found in any U.S. history textbook. The more recent movements are documented in current magazines and newspapers.

2. Point out some other current issues related to population. For example, large numbers of economic and political refugees are currently entering the United States. Globally, population is growing rapidly; world population passed 5 billion in July 1986.

3. Have students work in small groups to predict the next trend in population movements within the United States. Using current magazines and newspapers, have them search for items that may indicate the emergence of a new trend. Have each group report to the class on the evidence they found for the trend they are predicting.

Follow-up:

After various trends have been identified, have students brainstorm products they might market to take advantage of that trend. Have them write advertisements to promote some aspect of that new market (e.g., they might promote some form of transportation, as the railroads did in the 1870s). They might invent new products that would appeal to those caught up in the movement.

If continued mobility appears to be a trend, students might want to develop portable homes--not mobile homes like trailers or motorhomes, but homes that could be easily transported as complete units by air or rail. What would be the advantages?

Other students might be more interested in writing promotions for floating or flying cities modeled on the ideas of R. Buckminster Fuller.

Resources:

Fuller, R. Buckminster. *Critical Path*. New York: St. Martin's, 1981.

NINE POPULATION MOVEMENTS

The United States has experienced several trends in population movements. Some of those major trends are:

1. Western movement since the beginning of the nation
2. Gold-seekers to California in 1849
3. Massive immigration in 1901-1910
4. Infilling--the populating of the midwest, 1850-present
5. Urbanization--1850s-present
6. Suburbanization--1950s-1970s
7. Sun-seekers--movement to the Sun Belt, 1980s
8. Re-urbanization--movement back to the cities, into high-tech apartments in former factory buildings
9. Re-suburbanization--highly paid two-income families searching for safer, cleaner environments for children

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APPENDIX

FUTURE TECHNOLOGICAL DEVELOPMENTS

Anticipated future technological developments, some just now becoming available and some on the drawing boards or barely discernible, have been grouped into categories for convenience of description. The categories are: (1) medical/health, (2) pharmacological, (3) agriculture, (4) automation/robots, (5) energy, (6) transportation, (7) space travel/colonies, and (8) communications (including technology-aided education).

Medical/Health

There are three general aspects to the improvement of healthful living: prenatal care and decisions (from the decision to have a child, through fertilization and fetus development, to birth and early postnatal care); lifelong preventive medicine, healthful living, and disease prevention: and extending life expectancy through the cure of fatal diseases and use of life-extension devices. By the first decade of the 21st century, we can expect that the following will at least be available, if not in widespread use:

- New prosthetic devices: fingers, hands, arms, feet, legs--all under the normal control of the patient's nervous system with some electronic assistance.
- Laser canes are now available to the blind; the canes beep when an object or person approaches.
- Cryogenics will allow temporary suspension of life ("hibernation") in extremely low temperature environments.
- Many hereditary and congenital defects and diseases will be eliminated, especially through the use of genetic engineering techniques.
- Cyborg techniques and inventions will make possible replacements or substitutes for human organs and senses.
- Effective and convenient forms of appetite and weight control as well as means of controlling any form of addiction (e.g., smoking, alcohol, drugs).
- Techniques for controlled super-effective relaxation and sleep.
- Techniques to allow choice of sex and other characteristics of unborn children.
- The postponement of aging, along with limited rejuvenation and improved cosmetic surgery.
- New prevention techniques utilizing holistic health approaches and environmental control.
- Expanded use of psychotechnologies (e.g., psychotherapies, meditation, yoga, biofeedback, dream analysis) and development of new techniques for self-management of lifestyle.
- New diagnostic procedures (CAT-scan, angiogram) and surgical procedures (angioplasty).
- Expanded use of ovum and sperm banks.
- Improvement of machines that allow blind people to move a camera over any printed material while the index finger follows on an electronic pad the patterns of letters and words (in English not Braille).
- Improvement of machines that read any English written material and simultaneously translate it into a "human voice" readout; there are also talking calculators.
- An electrocardiogram belt that can be worn anywhere except in the tub or shower, constantly monitoring heartbeat and other vital signs.
- An artificial pancreas, a monitoring and dispensing device that measures blood sugar level and dispenses doses of insulin.

- New immunological vaccines and other controls for disease.
- New techniques of brain stimulation to control pain, eliminate paralysis, and modify and control self-destructive behaviors.
- Artificial wombs, fluid baths in which animal and human fetuses can be kept alive and nurtured through "birth."
- Bone marrow transplants to prevent and/or cure leukemia, bone cancer, and anemia.
- Cloning or parthenogenesis, which is using a cell (not an egg or sperm) from one organism to create genetically identical organisms.
- A variety of human-computer interfaces to control brain deficiencies and to improve memory and intelligence.
- Brain transplants by keeping brains alive outside the body during the lengthy surgical procedure.
- Regeneration of human body parts in much the same way lizards and worms regenerate limbs and segments.
- Since cancer researchers have just determined that it is highly unlikely we can ever eradicate cancer in all its many forms, we can still learn how to control it and catch it in its early stages.
- Undoubtedly, the next century will see the bionic human become a reality, as is dramatically portrayed in the diagram on the next page.

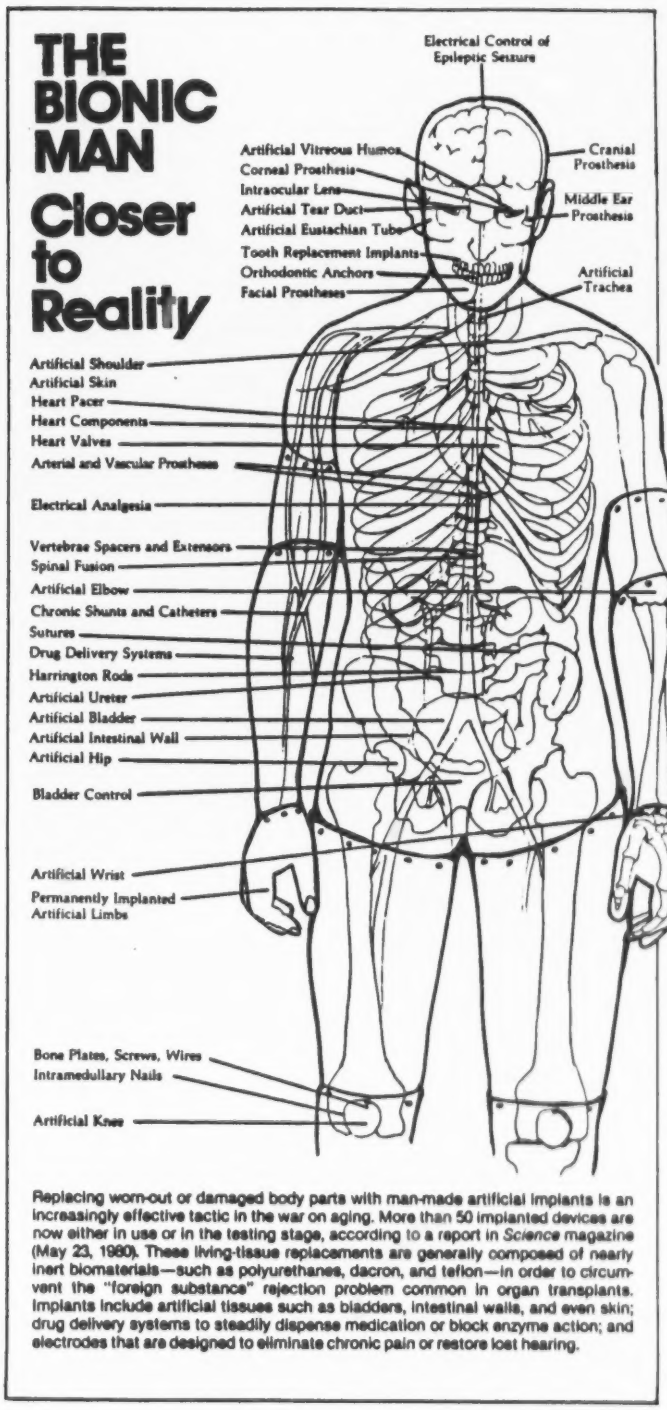
The results of medical developments will undoubtedly be an increase of life expectancy (at birth) from 70 years, to 100 years, to perhaps 150 years--even immortality is possible. Without other future developments, however, the question to be asked is: What quality of existence will a person experience in a lifetime of 150 or 200 years or one that extends forever?

Pharmacological

The companion to medical technology is the work of pharmacologists, who deal with the effects of chemicals and drugs on the human organism and who create and test a range of drugs and medicines that comprise the modern pharmacopoeia. As in the case of every technology, there are dangers in chemico-technologies, namely the side-effects and secondary (often delayed) effects of drugs whose primary effects are the cure or amelioration of diseases.

For the 21st century, the science of pharmacology will probably yield the following products:

- Improvement in contraceptives for fertility control, such as oral and male contraceptive pills effective for weeks or months.
- Creation of non-narcotic, nonaddictive drugs to control and/or modify behavior, especially neurotic and psychotic behaviors.
- Drugs to control fatigue, stress, relaxation, alertness, and moods in general.
- Drugs to inhibit aging and to prevent senility.
- Biochemical devices to identify, trace, and/or incapacitate persons for police and military uses.
- Drugs to stimulate the immune system to attack malignancies as in the current experimentation with interferon, a natural virus-fighter.
- Safe, effective growth and inhibitory hormones to alter body physiology.



Replacing worn-out or damaged body parts with man-made artificial implants is an increasingly effective tactic in the war on aging. More than 50 implanted devices are now either in use or in the testing stage, according to a report in *Science* magazine (May 23, 1980). These living-tissue replacements are generally composed of nearly inert biomaterials—such as polyurethanes, dacron, and teflon—in order to circumvent the "foreign substance" rejection problem common in organ transplants. Implants include artificial tissues such as bladders, intestinal walls, and even skin; drug delivery systems to steadily dispense medication or block enzyme action; and electrodes that are designed to eliminate chronic pain or restore lost hearing.

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Agriculture

The major problems, today and tomorrow, in American and world agriculture are rising costs of petroleum-based fertilizers and farm equipment, soil depletion, decreasing acreage for agricultural use, uncertainty of climate, soil erosion, availability of high-yield seed, and water shortages. Secondary problems are those of transportation to markets and distribution to consumers.

In the next 20 years, we will probably see most, if not all, of the following developments come to fruition:

- New, more effective techniques for meteorological forecasting, accompanied by better techniques for the modification and control of weather.
- Expansion of farming to new locales, such as the roofs of buildings in cities and suburbs and ocean farming of high protein fish.
- Development of biological, organic, non-fossil-fuel fertilizers to reduce dependence on high-cost, petroleum-based products.
- Improved production techniques and expanded use of methane and alcohol fuels for farm equipment.
- Less expensive methods for the desalination of sea water to make it possible to irrigate previously "useless" land.
- Genetically engineered plants that make their own fertilizer.
- Improved hybrid seeds coupled with genetically recombined new species of seed, resulting in increased per-acre yields.
- Automated factories for the raising and processing of poultry and fish.
- Computer-controlled farming, with the farm conceived of as a self-contained ecosystem in which water and nutrients are constantly recycled.
- New plant species that grow in salty soil that are hardy perennials blooming yearly without replanting, or that yield several harvests per growing season.
- Human diets changed to incorporate more nutritious, high protein foods such as rabbit and beefalo.
- New, more effective techniques for storage, conservation, and recycling of water.
- Improved techniques of food preservation, storage, packaging, and transportation.
- Home computers that permit remote buying of supermarket products, which will also save supermarket space and the cost of shelf displays and advertising.

Automation/Robots

With the advent of automation and robots, the abolition of strenuous, tedious work has become a technological possibility. Automation is a process applied to machines whereby they become self-correcting through the use of information feedback and the capacity to adjust themselves. Automation is enhanced by hooking the machine to a computer, allowing for response to hundreds or thousands of contingencies.

A robot is any creation by a human (or by another robot) that is able to sense, to decide, and to act. Its potential for making decisions and for complicated actions is multiplied by incorporating computers in its design. Already, most of us are familiar with welding robots in automobile plants and robot toys on wheels with wire sensors.

The greatest economic potential for automation and robots in the near future appears to lie in three sectors of the market: (1) industrial productivity, (2) replacing workers in hazardous occupations,

and (3) recreational toys. Probably somewhat later, reasonably priced household robots will appear as mass-produced gadgets.

At present, about 18,000 robots are at work in Japanese factories; about 7,000 are at work in the United States. They perform an array of manufacturing functions, such as grinding, cutting, welding, fitting, performing quality checks, and moving inventories from place to place in warehouses. A new generation of mobile robots will soon be working in environments hazardous to (even hostile to) human life, such as in mines, in tunnels, on skyscrapers, and underwater. In the next century, robots will fix gas leaks, cap oil wells, handle radioactive materials, and even build space stations.

Energy

Currently, the United States imports approximately 6 million barrels of oil a day, at a cost of $60 billion annually. Although the amount of oil consumed and the cost per barrel are important factors, the overarching issue is how the nations of the world will power their societies in the future. At least three dichotomies comprise this issue: use/non-use (i.e. conservation), near-term future/distant future (i.e., depletion vis-a-vis time), and nonrenewable energy sources/renewable energy sources (i.e., availability and pollution effects).

In the United States, excessive reliance on petroleum will change gradually over the next 20 to 30 years to use of a combination of multiple energy sources, both nonrenewable and renewable. In the short term, the 15- to 20-year transition period, we will continue to rely heavily on oil and gas, modified by improvements in efficiency (in engines, furnaces, ranges, etc.), by increased conservation efforts (spurred by higher prices and educational efforts), and by greater reliance on coal, nuclear power (fission), synthetic fuels (e.g., gasahol and methanol), and numerous types of solar energy (e.g., rays, wind, tides). In 1981, the following was our pattern of energy consumption:

Oil (barrels per day)	15.9 million
Gas (cubic feet)	19.6 trillion
Coal (tons)	729 million
Nuclear (Btu)	2.9 quadrillion
Synthetics (barrels per day)	0
Solar and other renewables (Btu)	4.8 quadrillion
Total Energy Use (Btu)	75.7 quadrillion

By 2000, it is estimated that our total energy use will be 97 quadrillion Btu's, with use of oil declining to 13.7 million barrels per day, coal and solar doubling, nuclear tripling, synthetics increasing to about 1.25 million barrels per day, and natural gas remaining constant.

But what about long-range prospects? Most estimates lead to the conclusion that by 2050 negligible reserves of oil and gas will remain. By this time Americans will be using coal, hydroelectric power, synthetic fuels, both fission and fusion nuclear energy, and numerous forms of solar power: solar panels, windmills, rising and falling tides, photovoltaic cells, and even gigantic solar collectors in geostationary orbit in space. Of course, conservation in the forms of non-use and improved efficiency will still be a crucial variable in the new complex energy formula.

Transportation

Involved in the category of transportation are the movement of people and goods, on earth and in space, short hauls and long hauls, commuting, business, and recreational travel. In the future, as in the present, the individual may have transportation needs that begin at a point on the earth's surface; for example, a home near the University of Colorado campus in Boulder, Colorado. From this point, one needs to get to work and to various commercial locations such as supermarkets and shopping malls.

Although this Coloradoan could currently reach these destinations by walking, by bicycle, or by shuttle bus, he/she typically uses the automobile, exemplifying Americans' love affair with their private autos.

Any transportation future for the United States must take into account this psychological phenomenon. Thus, the transportation matrix contains more than technological factors; it includes psychological, sociological, and educational variables as well. Merely improving the efficiency of the internal combustion engine will not suffice, although increasing the miles per gallon of four-cylinder car engines to 75-100 mpg will alleviate depletion and cost problems. What also will be needed are personal and social changes that yield receptivity to alternative modes of transportation, especially to multiple types of public transportation.

Not infrequently, our Coloradoan wants to take advantage of the many cultural and other services only available in the urban metropolis of Denver, 30 miles distant. Again, laziness and convenience combine to favor the family car, although downtown Denver traffic and the cost of parking are beginning to cause some to question the wisdom of avoiding the bus. If these factors continue to grow in importance, Denver and the surrounding metropolitan area may soon be served by a ground-level or elevated fixed-rail system, in addition to or as a substitute for existing buses.

What if the Coloradoan needs, for business purposes, to travel to Chicago, or New York, or Los Angeles? Amtrak is too slow and offers few of the amenities formerly provided on trains. Hence, the inevitable answer is air transportation. But our business traveler must begin such a trip from home and thus must make some arrangement to get to the Denver airport from Boulder and to reverse the procedure at the end of the trip. If the flight destination is the JFK terminal in New York City, our business traveler is again faced with ground transportation into the city and out again after concluding his/her business. These two flights and the related four ground trips might be tolerable as requirements for conducting some types of business, but when they are combined with other stressful and often inconvenient conditions, business travel becomes an unwelcome chore.

Planes today mesh cramped seats (six across and restricted leg room) with near-capacity loads, making two- to four-hour trips uncomfortable for passengers. At large city terminals, to be assured a parking space at a reasonable rate, one must park a mile or two away from the airport. Further, buses and shuttle buses (or airport limousines for the wealthier) are often crowded, scheduled inconveniently, and present a formidable challenge for anyone with much baggage. Airports themselves are now crowded, with overpriced goods and services, and long check-in lines. If this situation is discouraging, consider the obstacles in air travel for the family embarking on a vacation.

Of course, business and tourism today are not limited to travel within the borders of a single nation. All the world is a market, and everyone is an international tourist, at least potentially. There is even a polar route, eight-hour non-stop flight between Denver and Frankfurt, West Germany. As aircraft speeds increase, however, they are accompanied by fuel pollution, noise pollution, and excessive consumption of fuel, to the point that, at least in the United States, the development of the supersonic transport was halted by Congress, and the French-U.K. Concorde is only allowed to land at airports that are approached from the ocean. But clearly, in another sense, we do have a supersonic "plane" in NASA's space shuttle.

All the above modes of transportation already exist, so what can we expect in the next 20 years or so? The following developments are likely by the year 2000:

- Four-cylinder car engines that get 100 mpg or more.
- Improved bullet trains (like some that exist now in Japan and West Germany) suspended on electromagnetic cushions just above power rails; these trains move at speeds of 300 mph or more.
- Smaller cars and safer cars.
- Some electric cars for short commutes; recharging of batteries at home or in specially equipped city parking garages, all during late-night hours.

- In big cities, more subways, trolleys, and "moving sidewalks" (like some of the current moving ramps in airport concourses).
- Some drone vehicles (pilotless, driverless, conductorless, etc.)--trains, subways, mine trains, warehouse forklift trucks, and cars.

Space Travel/Colonies

The human animal seems driven to surmount apparently impossible challenges--to capture the "magic" of lightning in fire, to move over the earth faster than any other animal, to construct buildings taller than any tree, to fly like the birds yet faster and higher, and even to overcome our earthbound nature by creating homes in space. Given the implacable obstacles, what remarkable achievements the human species has realized! How can we not expect that in some future we will roam and make home the entire universe?

But what is reasonable to expect in the next two or three decades? With our many pressing problems of keeping our home planet habitable and the increasing cost of launching space vehicles, the world's nations can give only limited financial reserves to the monumental efforts of space travel and colonization; but this is true only in the short run. The moral imperative of social justice and stewardship, in combination with unforeseen obstacles and a modicum of humility, will leave many challenges for our children's grandchildren and their children in our inexorable space odyssey. By the year 2010 (in honor of Authur C. Clarke), we can expect the following events:

- Increased commercial (non-defense) chartering of the space shuttle by U.S. and foreign corporations to further investigate the economic potential of near space and the moon and to launch from the shuttle numerous new communications satellites.
- A semipermanent, manned spacelab in geosynchronous orbit to conduct basic and applied research; perhaps as many as three labs, one each over the U.S.S.R., Western Europe, and the United States.
- Further exploration of our solar system, of a few of the planets and their moons, by manned and unmanned probes.
- A few scheduled flights of the space shuttle reserved for rather expensive prestige tourism; the equivalent for the rich of a "Sunday drive in the country."
- Perhaps a small prototype space colony located equidistant between the earth and the moon, with a primary purpose of gathering solar energy in huge, flexible panels to in turn be beamed back to power stations on earth.

Missing from this section on space, and from all the previous categories of technological developments, is the uncongenial topic of weapons technologies, including nuclear devices, their missile delivery vehicles, land and ocean launch sites, "conventional" weapons, orbiting reconnaissance satellites, and the general militarization of space. With current levels of military expenditures worldwide, ample funds are available to create the means for numerous unimaginable holocausts. If present levels of funding continue through the end of the century (increases are more likely), weapons specialists will probably develop many--if not all--of the following weapons technologies:

- Lethal and incapacitating biochemical agents.
- Laser and maser beam rifles and cannons.
- Super helicopters for airborne infantry and artillery.
- More effective brainwashing techniques.
- Less expensive and more mobile nuclear devices.
- Space "defense" systems, beginning with anti-satellite missiles.
- More accurate nuclear delivery systems.

- Battlefield electronic surveillance, camouflage, and evasion.
- Increased range of artillery shells propelled by electromagnetic "mass movers."
- Space-based nuclear weapons (currently prohibited by SALT).

Ironically and fortunately, the history of war and the development of lethal weapons have frequently led to benign applications and peacetime uses. It is difficult today, however, to envision benefits to humankind deriving from nuclear war.

Communications

One way of defining technology is to consider it as the variety of means, modes, or techniques for extending the power or influence of the human being. For example, a bow and arrow extends the range of the human arm, which is not capable of throwing a projectile as hard and far as the bow catapults the arrow. Or, as another example, the automobile extends the speed and range of human mobility; that is, a person cannot walk or run as far or as fast as one can travel using a car. In the domain of communications, technologies extend the abilities of hearing, speech, memory, sight, thinking, and other human communication capabilities. For example, the telegraph and Morse code (the first a "hard" technology and the latter a "soft" one) extend the range of the human voice and human language, albeit in coded form. The telephone was the logical successor to the telegraph.

Communication technologies have historically evolved from language to tom-toms, smoke signals, and megaphone, to writing and the printing press, to telegraph and telephone, through radio, television, and communication satellites. In this century, the evolution of calculators--abacus, mechanical calculators, electronic calculators, computers--has merged with the history of communication techniques. Thus, today we have a complex of natural, machine, and synthetic languages, of audio and visual devices (wired and wireless), and of slow/fast, small/large, and minimum memory/extensive memory computers.

If we are currently in the Communications Revolution, it is because of the potential for communication systems (multiple combinations of techniques and devices) that can be derived from combining the following:

- Telephone (handsets, copper and fiber-optic cable, electronic switching equipment, microwave transmission and relay stations).
- Radio (AM and FM transmission to home and car receivers).
- Television (black-and-white and color, wireless and cable, laserdisc and VCR, commercial discs and cassettes).
- Computers (large mainframes, minis and micros, processing speed and memory capacity, disks and diskettes, monochrome and color monitors, software programs, and the capability of interface with and control all the above hardware and software).
- A worldwide electric power grid that permits use of all the above devices by almost anyone, almost anywhere.
- Space-based communication satellites that permit wireless transmission from almost anywhere to almost anywhere else.

The importance of the computer in communications is its capability to control (by interfaces and interactions) multiple modes of communication (i.e., systems) with incredible speed and precision. The future of communication technologies holds the promise of:

- Improvements in computers: smaller units, faster performance, greater memory capacity, more functions, and wider applications.
- Improvements in television: smaller units, bigger screens, smaller VCRs and more types of cassettes available, more on-the-air channels as well as cable channels (up to 100 or more).

- Expanded "electronic marketing": postal service; shopping for groceries and other products; banking; publishing of books, newspapers, magazines, and journals; bills and advertising; and bartering of information and products.
- Expanded uses for remote control (wireless as in current use with television sets and VCRs) and perfection of voice-actuated equipment such as typewriters and tape recorders.
- Improved artificial intelligence (via computers and in robots with voice synthesizers).

These developments, and many of those in other categories, will undoubtedly have dramatic effects on how humans exist and interact in the home, the workplace, and in educational institutions. Assuming that private and public schools at all levels, from pre-schools to universities and other continuing education institutions, will continue to exist for at least the next 25 years, how will these places of learning be affected by the new, communication technologies? In regard to computers, Decker Walker of Stanford University states: "My experience--derived from three years of reading, thinking, and working with computers and computer-based education programs--leads me to identify seven main ways that today's microcomputers can contribute to education. These are (1) more active learning, (2) more varied sensory and conceptual modes, (3) less mental drudgery, (4) learning nearer the speed of thought, (5) learning better tailored to individuals, (6) more independent learning, and (7) better aids to abstraction." (See "Reflections on the Educational Potential and Limitations of Microcomputers" in the October 1983 *Phi Delta Kappan* for more of Walker's views on computers in education.)

As a "teacher," the computer can manage the instructional process, can construct and analyze tests, and can be an interactive tutor. Computers can help motivate students to learn, can aid both teachers and students in developing problem-solving skills, and can assist in the many routines and records of classroom management. But perhaps the greatest potential use of the computer is as the manager of peripheral devices (sometimes called Interactive Computer-Assisted Instruction) such as printers, VCRs, slide projectors, and the like.